Fargo Fire Department

2012 Standard of Response Coverage

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Introduction

In 2001, the Fargo Fire Department (FFD) developed a comprehensive strategic plan for fire protection in the City of Fargo (the "City"). This plan was called *Fargo Fire Department Emergency Response - 2002 and Beyond*. In the 2002 plan, the department defined the risks and has since been planning for the successful mitigation of emergencies resulting from these risks. In 2008, the department began the process of seeking accredited status through the Commission on Fire Accreditation International (CFAI). One of the required elements of the accreditation process was a standard of cover (SOC). In 2009, the FFD wrote the department's first SOC, which met the requirement and provided a thorough assessment of the community's risks. It also evaluated the fire department's emergency response capabilities. The document contained a significant amount of data that was primarily intended for use by fire department personnel. This document is an updated version for 2012. Information from this document will be used in the strategic planning in 2012 and following years.

Description of Community

Geographic Characteristics of the Service Area

Fargo is the largest city in the state of North Dakota and the county seat of Cass County. In 2010, its estimated population was 105,549 and the estimated metropolitan population was 200,102. Fargo, along with its neighboring city of Moorhead, Minnesota, as well as adjacent West Fargo, North Dakota and Dilworth, Minnesota, form the center of the Fargo-Moorhead, ND-MN Metropolitan Statistical Area. The City of Fargo is the crossroads and economic center of a large portion of eastern North Dakota and a portion of northwestern Minnesota. Fargo is a retail, manufacturing, healthcare, and educational hub for the region. According to the greater FM Development Corp., the Fargo Moorhead area is the primary trade area for 352,647 people. Fargo is home to North Dakota State University. Figure 1 on the next page is a map of the Fargo-Moorhead area (City info, 2011). The city area did not change in 2011.

Topography

Fargo sits on the western bank of the Red River of the North in a flat region known as the Red River Valley. The Red River Valley was once part of glacial Lake Agassiz, which drained away about 9,300 years ago. The lake sediments deposited from Lake Agassiz made the land around Fargo some of the richest in the world for agricultural uses.

Climate

Due to its location in the Great Plains and its distance from both mountains and oceans, the City has an extreme continental climate. Table 1 shows the annual average temperature and precipitation for the area.

Table 1. Average Temperature and Precipitation

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg high °F	18	24	36	56	69	77	82	81	71	56	37	22
Avg low temperature °F	0	6	19	33	45	55	60	57	47	35	20	6
Precip inches	0.70	0.64	1.30	1.36	2.81	3.90	2.79	2.56	2.57	2.15	1.00	0.83

(The Weather Channel, 2012)

While the table above illustrates the averages for temperature and precipitation, it does not represent the extremes. During winter primarily months of January and February, it is common to have temperatures from -20 to -40 °F. In summer months primarily July and August, temperatures are often above 90 °F. Because of the extremely flat terrain, large amounts of precipitation have a significant impact. In the past 60 years, snow fall has averaged 40.8 inches per year. However, in the winter of 1996-1997 Fargo received 117 inches of snow. Hot, humid summers can produce severe thunderstorms delivering several inches of rain in a short amount of time.

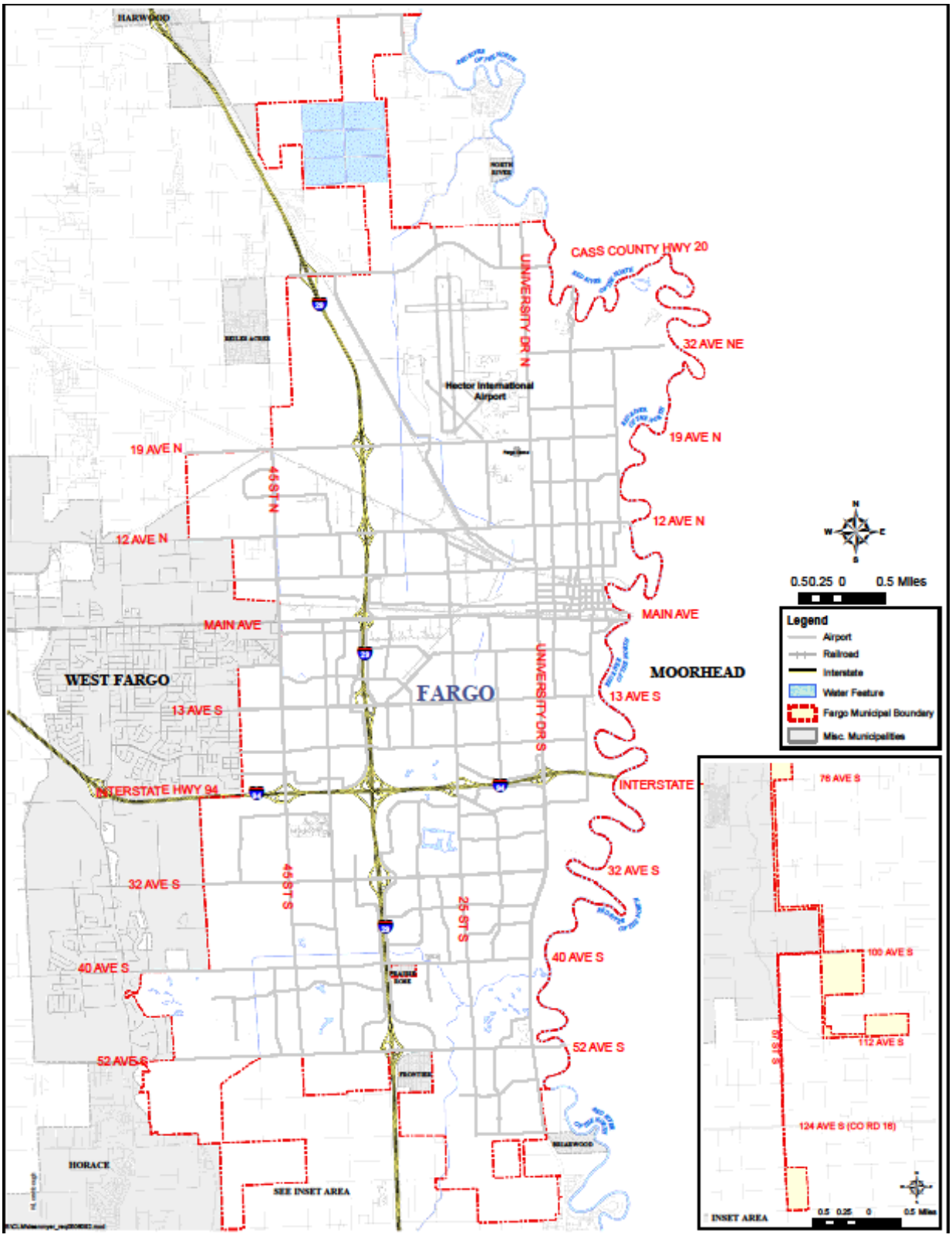


Figure 1. Map of the City of Fargo

Climatic Impact on the Fire Department

While the FFD must be prepared for the wide variances in temperature, the predominant climatic impact on the FFD service delivery is associated with winter conditions. Precautions are taken, such as annual checks of all hydrants, identifying any hydrants that are in need of repair. For any hydrants in need of repair, the deficiencies are corrected, including the pumping out of hydrant barrels that have been found not to drain. This ensures frozen hydrants are not encountered during an emergency. Apparatus are purchased with enclosed and heated pump compartments to safeguard against pump freeze-up. Fire ground operations are adapted to cope with the frigid temperatures. Hose lines are kept flowing with water to avoid freeze up and ice grippers are distributed for firefighting boots to prevent slips and falls.

The effects of the winter conditions upon the FFD's service delivery are to be expected in North Dakota. Since the formation of the department in 1875, severe changes in weather conditions have been planned for, and successfully adapted to. An occasional increase in response time associated with winter driving conditions is probably the most significant consequence.

Census, Population and Area

The information in table 2 from the 2005-2007 Census Bureau represents the social, demographic, and economic characteristics for the City of Fargo and how it compares to the United States.

Table 2. Social, Demographic and Economic Characteristics

	Estimate	Percent	United States
Average household size	2.00	(x)	2.60
Average family size	2.74	(x)	2.74
Population 25 years and over	57,496	(x)	(x)
High school graduate or higher	(x)	93.50%	84.00%
Civilian veteran (18 years and over)	7,397	9.80%	10.40%
Disability status	11,012	12.60%	15.10%
Foreign born	4,420	4.70%	12.50%
Speak a language other than English at home	6,747	7.60%	19.50%
Household population	88,418	(x)	(x)
Median age (years)	30.50	(x)	36.40
Under 5 years of age	5,648	6.0%	6.90%
65 years and over	9,662	10.20%	12.50%
One race	93,273	98.60%	97.90%
Two or more races	1,330	1.40%	2.10%
White	87,591	92.60%	74.10%
Black or African American	2,111	2.20%	12.40%
American Indian and Alaska Native	1,178	1.20%	0.80%
Asian	1,789	1.90%	4.30%
Native Hawaiian and Other Pacific Islander	114	0.10%	0.10%
Some other race	490	0.50%	6.20%
Hispanic or Latino (of any race)	2,003	2.10	14.70%
In labor force (16 years and over)	58,582	75.10%	64.70%
Median household income (2007 inflation adjusted)	39,406	(x)	50,007
Median family income (2007 inflation adjusted)	60,728	(x)	60,374
Per capita income (2007 inflation adjusted)	26,105	(x)	26,178
Families below poverty	(x)	9.70%	9.80%
Individuals below poverty	(x)	15.70%	13.30%

(Fact Sheet Fargo, ND, 2007)

While the above information indicates that white is the predominant race within the City of Fargo, not all ethnic backgrounds are represented. European refugees are not included. From 1990 to 2003, almost 5,000 refugees from 40 countries resettled in Fargo with one in three coming from Bosnia. During the 1990's, Fargo's immigrant population more than doubled accounting for 12 percent of the City's total population growth (Economic/demographic information, 2009).

The population of the City of Fargo has risen from 61,383 in 1980 to 105,549 in 2011. This represents an increase in population of 72% (City info, 2011). See Figure 2.

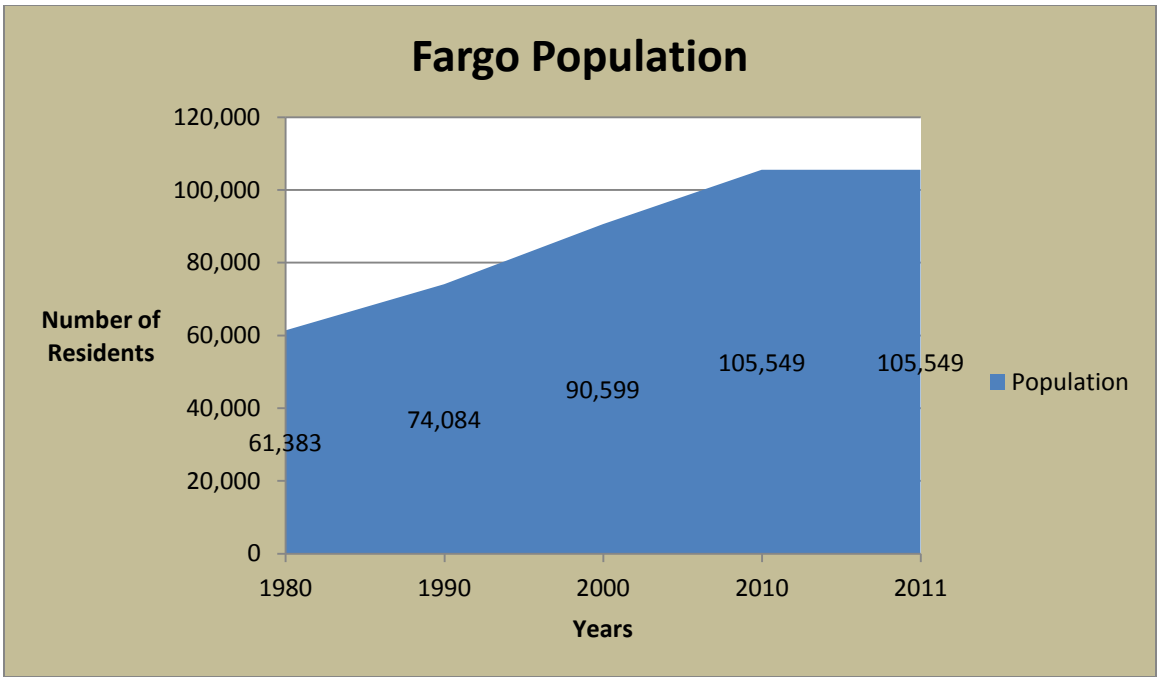


Figure 2. City of Fargo Population Growth (City info, 2011)

The geographic size of the city grew from 26.71 sq. miles in 1980 to 48.40 sq. miles in the year 2009. This is an increase of 81% (Annexation map, 2009). See Figure 3.

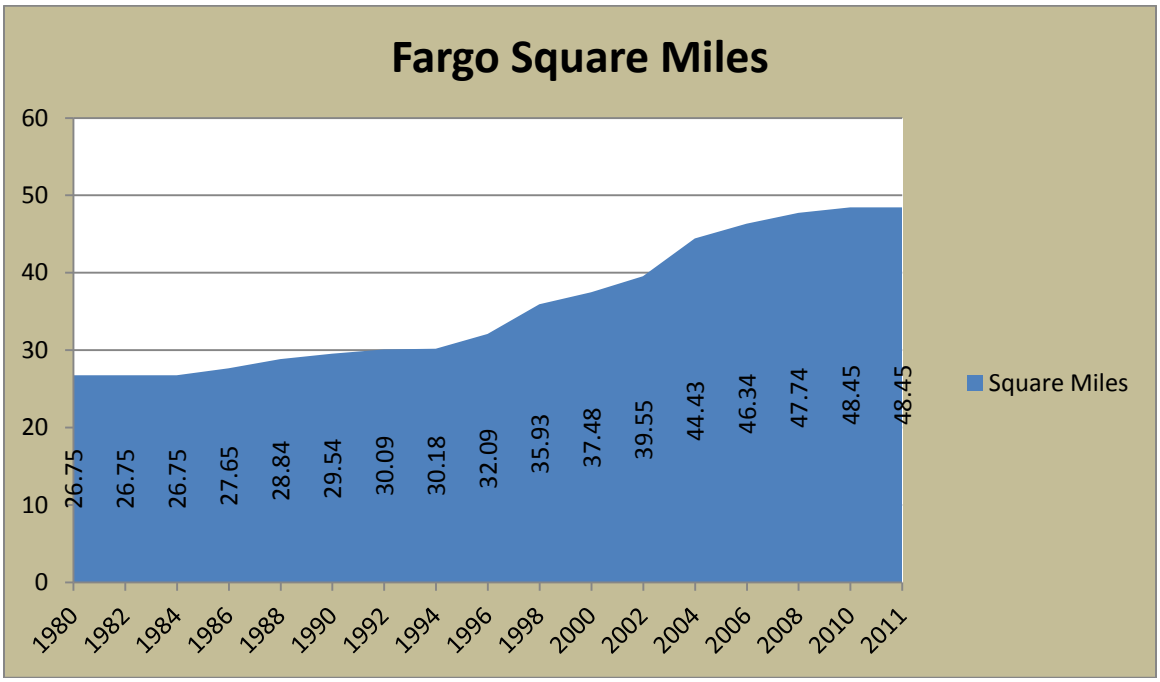


Figure 3. City of Fargo Growth in Square Miles

The above information represents the City's growth in population and area. How the FFD compares in growth is described in the following section.

General Description of Fire Protection

Just as the City has increased in population and area, the FFD has also experienced growth and an increase in the demand for service. In 1980, the fire department operated out of four stations, responding with four engine companies, and one ladder company. In 2010, the Fire Department operated out of seven stations, with seven engine companies, one aerial company and one rescue company. In 1981, the Fargo Fire Department responded to 827 calls for service. In the year 2011, responses numbered 4,785, an approximate increase of 540%.

The FFD of 1980 responded to a broad range of emergencies but had little specialized training. In 2011, the department provides personnel trained to Emergency Medical Technician (EMT-B) level for EMS service and personnel trained to hazmat technician and specialist levels to assist in staffing the Minnesota Regional Hazardous Materials Response Team and the North Dakota Regional Hazardous Materials Response Team. Since that time, it has also established a technical rescue team that is trained to respond to various special rescue emergencies.

In 1980, fire suppression, fire prevention, and support divisions totaled 85 personnel. Total staffing of the fire department in 2011 is 115 personnel; an increase of 30 personnel in 31 years. Three stations, three engine companies, and one rescue company have been added since 1980. The increase in responding vehicles came with a 35.3% increase in staffing. Figure 4 represents FFD staffing from 1980 to 2011.

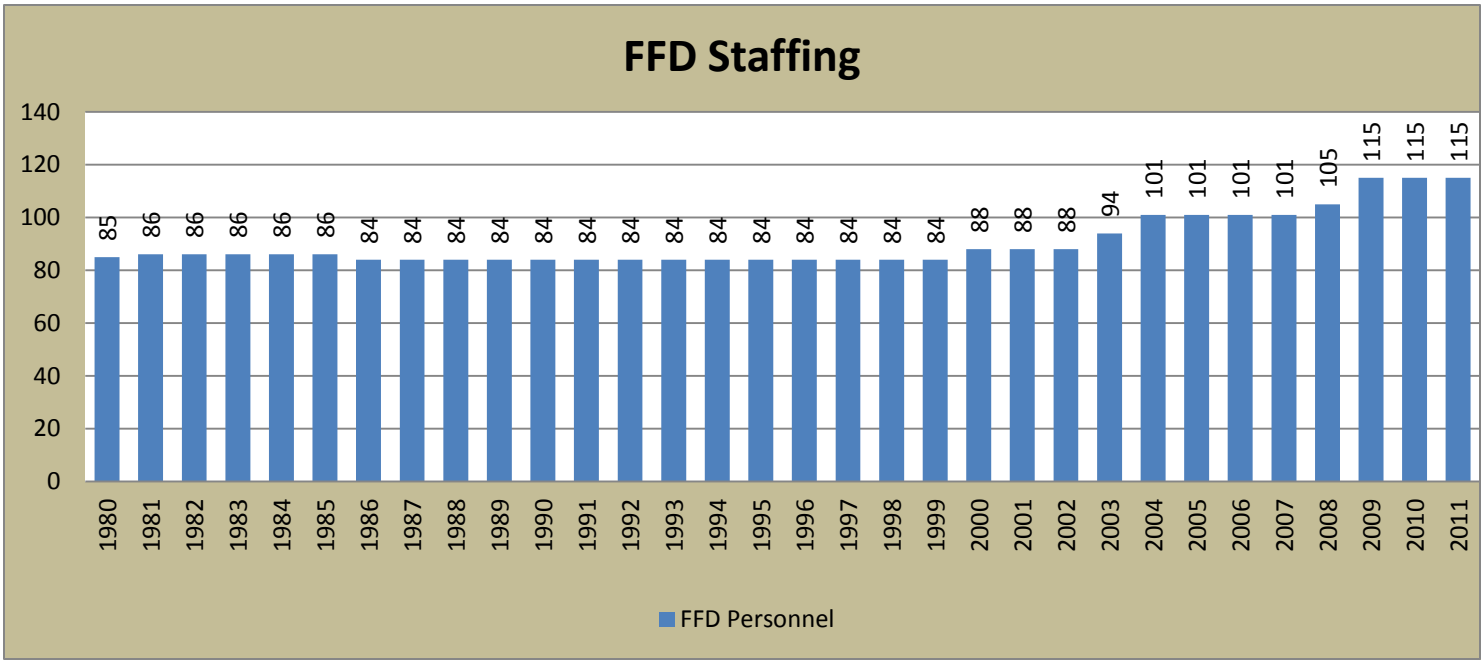


Figure 4. FFD Staffing Since 1980

Figure 5 shows the comparison for growth of the City in area, population, and FFD staffing.

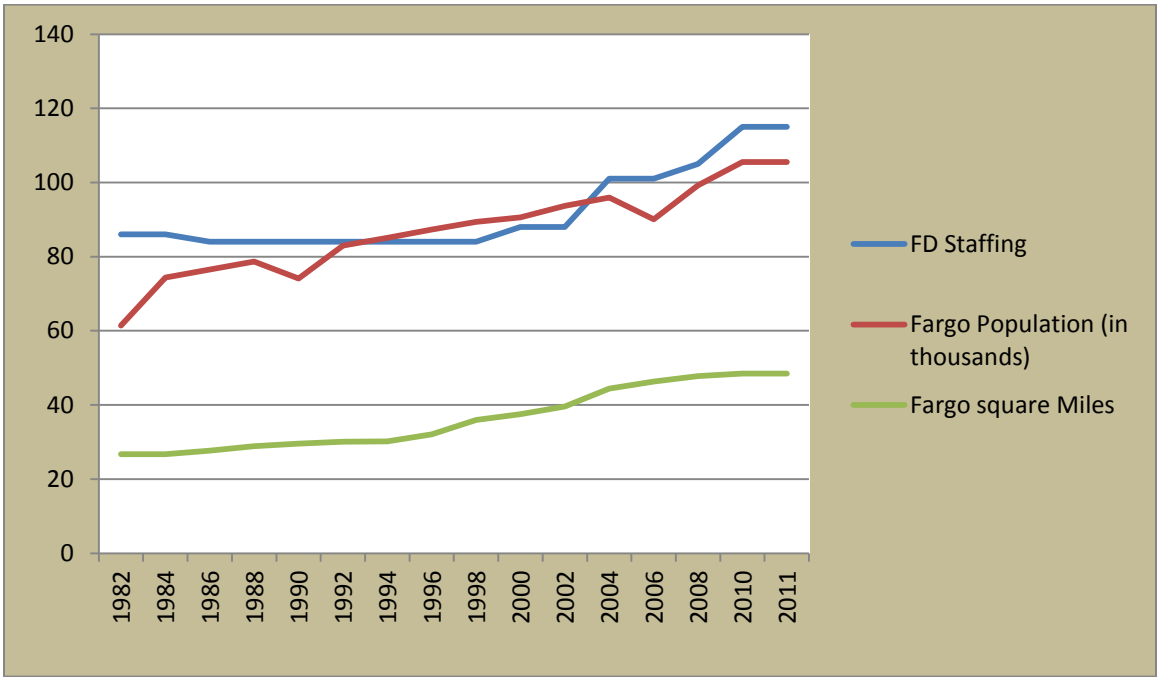


Figure 5. Growth Comparison

The above graph represents the percentage of increase. This graph makes it apparent that the department has been more successful at meeting the needs of the community since the presentation of the 2001 strategic plan to the City Commission.

Staffing, Apparatus and Stations

Currently within the FFD there are 115 personnel of which 102 are in fire suppression. The suppression division is further divided into three rotating 24 hour shifts of 34 to provide continuous protection to the City of Fargo. The current minimum daily staffing per shift is 26 with seven stations in operation.

Current first line apparatus and their staffing include:

- Seven engine companies with a minimum of three personnel each.
- One aerial truck with a minimum of two personnel.
- One command unit (with one Assistant Chief).
- One special operations truck (Rescue) with a minimum of two personnel.
- One heavy rescue trailer with tow vehicle. When this is needed, it is brought to the scene by engine company or rescue personnel.
- One hazardous materials vehicle with trailer. When needed, this vehicle is staffed with engine company personnel.
- One weapons of mass destruction trailer and vehicle. When needed, this is staffed with personnel from an engine company.
- Three Zodiacs and one small boat. The Zodiacs are inflatable rescue boats with recovery and ice rescue equipment.

Reserve apparatus includes:

- Three engines.
- One aerial.
- One rescue truck.

Fire station locations and assigned apparatus:

Station 1 (637 NP Ave. N)

- Engine Company 801.
- Ladder Company 821.
- Command Officer 800. (Assistant Chief)
- One Zodiac.
- Station 1 houses the Administrative and Support Staff (six) and the Fire Prevention Bureau (four).
- Station 1 also houses four firefighters on administrative duties.

Station 2 (3020 25 St S)

- Engine Company 802.
- One Boat.

Station 3 (1101 25 Ave N)

- Engine Company 803.
- One Zodiac.
- The salvage trailer, which contains extra tarps, plywood sheeting, and lumber to close up buildings. It also contains an insulation vacuum for removing cellulose insulation during overhaul.

Station 4 (2701 1 Ave N)

- Engine Company 804.
- Special Operations Vehicle 834 (Rescue). The Special Operations unit has equipment to deal with auto extrication, confined space rescues, rope rescues, and limited trench and structural collapse rescues.
- Heavy rescue trailer with tow vehicle. The heavy rescue trailer contains additional equipment to deal with trench and structural collapse rescues.
- One Zodiac.
- This is the location of the FFD's training facility, which includes a burn building and training tower.

Station 5 (930 40St S)

- Engine Company 805.
- Weapons of Mass Destruction trailer (WMD) and tow vehicle. The WMD trailer contains equipment to deal with mass decontamination procedures as well as other hazardous material mitigation equipment.

Station 6 (4630 15 AV N)

- Engine Company 806.
- Two reserve engines.
- A trailer with shoring lumber for heavy rescues.
- A RIT training trailer and a SCBA training trailer.
- Station 6 houses an indoor confined space trainer and has capabilities for indoor rope rescue training. Adjoining classroom facilities are available in the public safety portion of the building, along with offices housing the City and County Emergency Managers.

Station 7 (3957 Village Lane)

- Engine Company 807.
- Hazardous Material Response unit and trailer.
- One reserve aerial.
- Station 7 includes an additional office/bedroom for future expansion.

Description of Loss and Injury

The following information looks at yearly loss totals related to fire. This includes monetary as well as civilian death and injury. Yearly totals of firefighter injuries are also examined.

Fire Loss

Figure 6 shows the total fire related dollar loss from 2000 to 2011. A higher than normal loss is shown in 2000. On April 30th, an arson fire destroyed one quarter of a city block in downtown Fargo resulting in over two million dollars in losses. Later that year, an apartment building on NDSU property was destroyed resulting in $850,000 in losses. In 2010 there is also a higher than normal loss shown due to a large apartment building fire that resulted in $6,490,000 in losses from one fire.

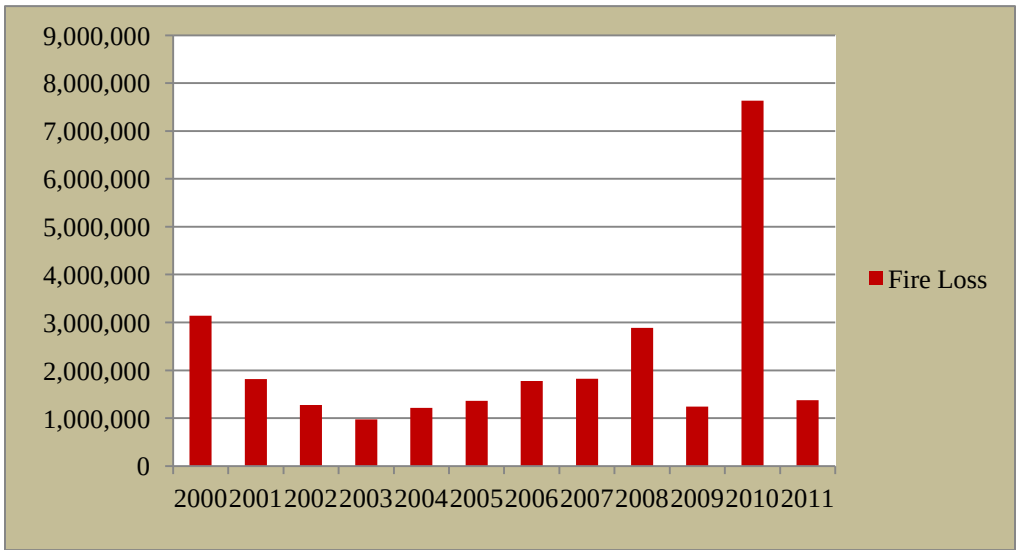


Figure 6. Total Fire Loss in Dollars

Fire Related Civilian Death and Injuries

In the NFPA report *Fire Loss in the U.S. 2007*, from 2004 to 2008, communities with a population of 50,000 to 99,999 averaged .96 fire death per 100,000 people, Fargo's 10 year average is .79. The same NFPA publication shows civilian injuries for the Midwest averaged 7.82 per 100,000 population. Fargo's average of 5.5 is again lower. Death and injury rates are difficult to trend due to the low occurrence of death and injury from fire in Fargo. One catastrophic fire could change trends dramatically. Fire injuries are also difficult to compare due to civilians not reporting injuries when the fire department is not called or when they seek treatment on their own. Figure 7 is a chart showing civilian deaths and injuries from 2000 to 2010.

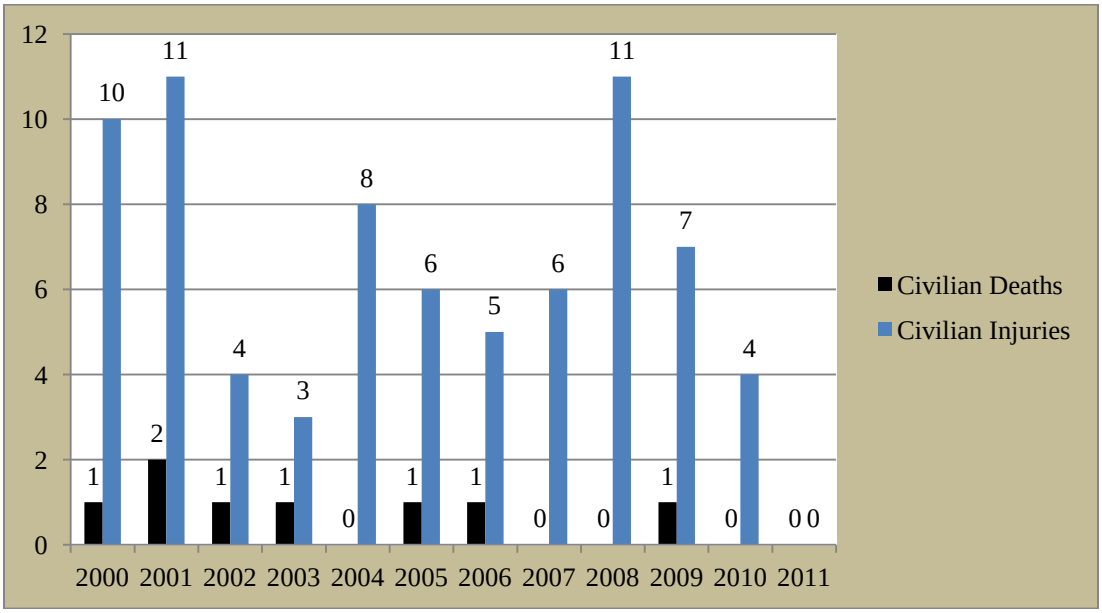


Figure 7. Civilian Death and Injuries

It has been demonstrated that socioeconomic factors impact the demand for fire department services. Fire deaths in the biggest cities are roughly 50% higher than in small cities, but fire deaths in rural communities with populations less than 5,000 are more than 100% higher. The peak rates in very small and very large communities are concurrent with high poverty rates in these two types of communities.

Firefighter Injuries

Figure 8 represents the number of reported firefighter injuries in the FFD from 2000 to 2010. The number of firefighter injuries has increased in recent years mostly because of a change in reporting procedures. The City of Fargo began to more rigorously enforce Worker's Compensation requirements in the last few years. These requirements expect firefighters to report any injury whether or not the individual seeks medical attention. In the past, this was not emphasized and many small injuries did not get reported when the individuals did not seek medical attention. More reports of small injuries can result in the potential for changes that improve safety.

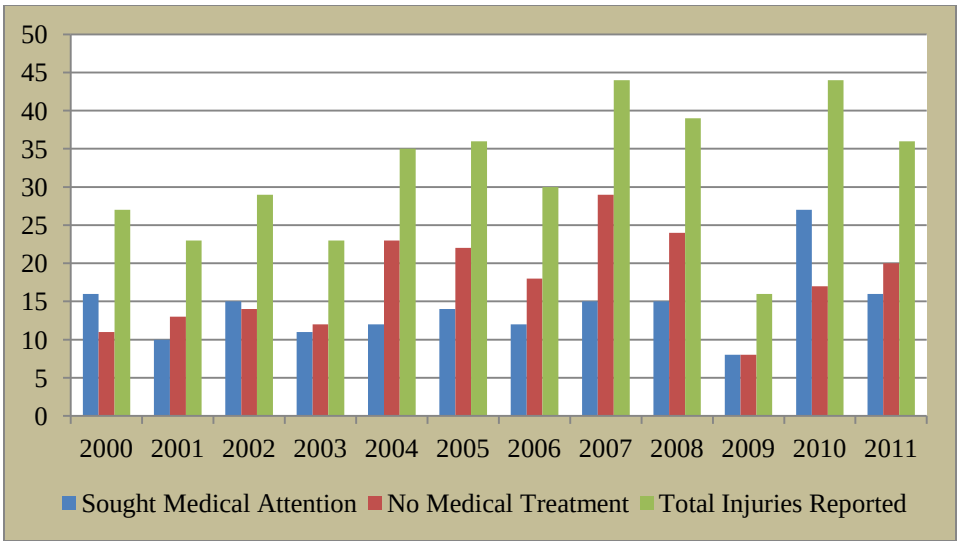


Figure 8. Firefighter Injuries

Risk Assessment

Introduction

In a risk management model, risk is the possibility of loss or injury. Because risk is a possibility, it has an element of uncertainty, which can be estimated and, to a certain extent, can be controlled or managed. The consideration of risks raises the following questions:

- What areas of the City pose the maximum fire risk? These are the risks that require the maximum amount of fire protection resources or which would result in the greatest loss of life or property.
- What properties, if destroyed, would be a critical or essential economic loss to the community? The loss of commercial property, particularly manufacturing firms that employ a large number people, would have a significant negative impact on the community.
- What are the greatest non-fire risks? These are risks such as transportation networks, hazardous materials, and natural disasters.

These questions were used as the basis for the following risk assessment. This assessment breaks the City down into planning zones, defines risk categories, and analyzes several risk factors within each zone.

Planning Zones

The FFD uses first due engine company response zones as its planning zones (PZ). Figure 9 is a map depicting the eight current planning zones. The far south section of 802's response area may in the future be the location of another fire station. For planning purposes this area will be designated PZ 8.

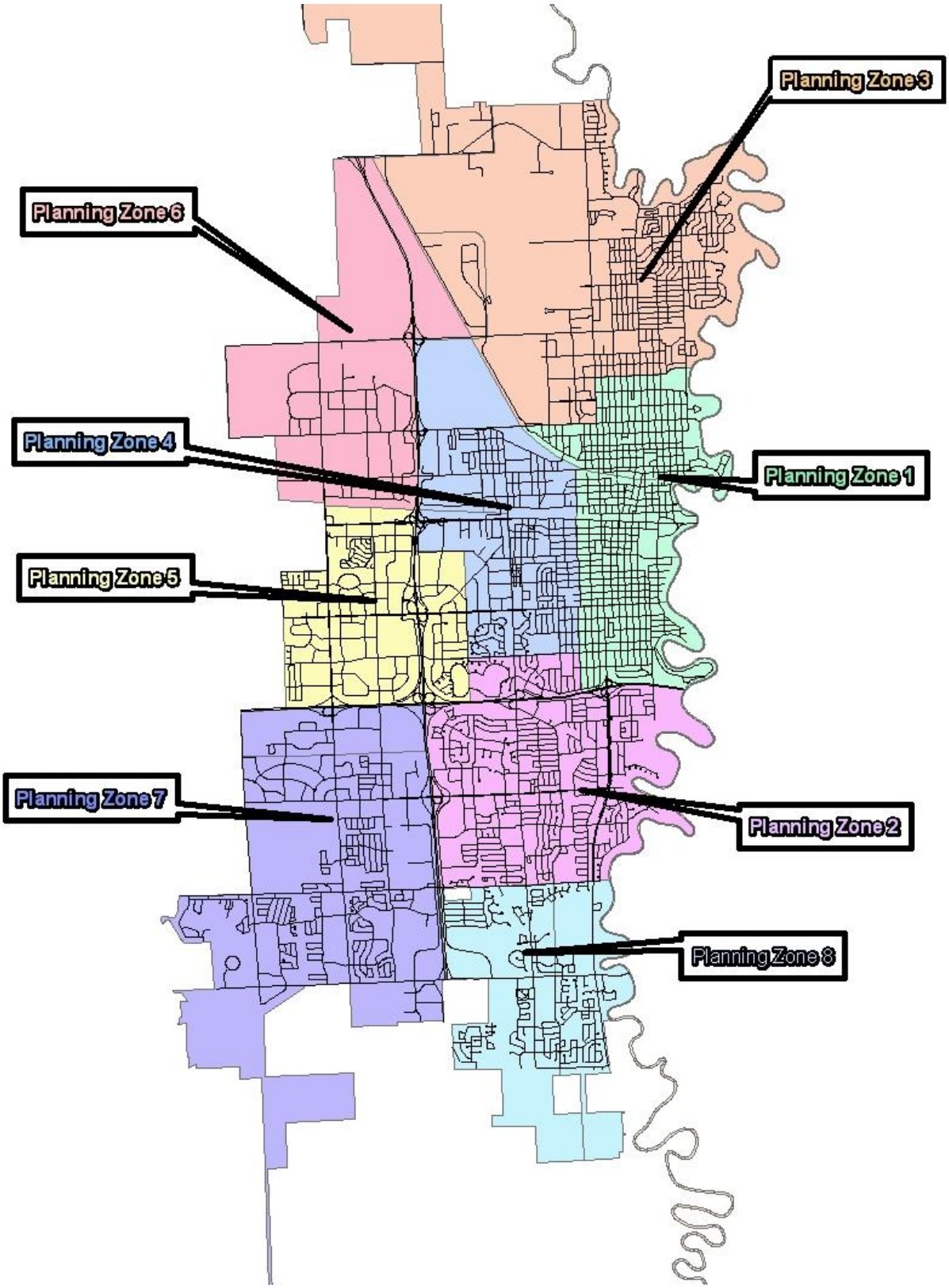


Figure 9. Map of Planning Zones

Risk Categories

The FFD has established three categories of risk; these categories are identified as low, moderate and high. Low risks are considered to be primarily single unit calls. Moderate risks are those that threaten a small number of people or have a limited impact on the economy. Single-family houses, twin homes, and small commercial buildings are the bulk of the properties that make up the moderate risk category. Using criteria in the *International Fire Code*, the leadership of the Fargo Fire Department theorized that single story buildings less than 6,500 square feet were a moderate risk. 6,500 square feet was chosen because that square footage was correlated to an occupancy load of 300. Occupancy loads in public assemblies greater than 300 hundred are deemed a higher risk in the *International Fire Code* and have several higher standards for fire protection, such as a need for sprinkler systems, alarm systems, and greater exiting requirements.

LOW RISK

Low risk includes:

- Vehicle fires.
- Carbon monoxide calls.
- Grass fires.
- EMS calls.
- Automobile accidents up to two vehicles.
- Storage shed and other small outbuilding fires.
- Dumpster fires.

MODERATE RISK

Moderate risk includes:

- Single family houses.
- Twin homes.
- Mobile homes.
- One story commercial buildings under 6,500 square feet.
- Detached garages.
- Apartments with less than four units.
- Vehicle crashes on the interstate or involving more than two vehicles.

HIGH RISK

High risk includes:

- Hospitals.
- Nursing homes.
- Schools.
- Apartment buildings greater than four units.
- Commercial buildings greater than one story or greater than 6,500 square feet.
- Public assemblies.
- Manufacturing.
- Businesses that store or use reportable amounts of hazardous materials.

OTHER RISK

There are several other types of non fire situations, which could occur that require a unique response depending on the type of call. The FFD has trained personnel in these specialty areas as well as the necessary equipment. These risks include:

- Structural collapse.
- Confined space.
- Trench rescue.
- High angle rescue.
- Water / ice rescue.
- Hazardous material.

Risk Data

The FFD has been accumulating information on buildings through the inspection process for several years. The department has data on building class (occupancy type), type of construction, type of roof, number of stories, number of apartments or units, and fire protection systems. This data is currently stored in a computer system that is not easily accessed by planning software. This information will be more usable in the future after converting from the AS400 to New World's Windows based computer aided dispatch/record management system (CAD/RMS). At that time, the FFD intends to evaluate how this information can be incorporated into the new RMS and used in future risk assessments. Until that time, in order to accumulate sufficient data for the risk assessment several computer programs and data bases are being used, which include:

- Fire House software - current record management system.
- ARCMAP software - application to view and edit geographic data.
- NFIRS 5 Alive software - analyzes emergency response data.
- City of Fargo Assessor's data base.
- City of Fargo Engineer's data base.
- Fargo Moorhead Metropolitan Council of Governments (METROCOG) 2005 job analysis.
- TIER II reports.

In order to analyze the various risk data, the FFD has integrated the department's RMS, as well as the databases from other City departments and other agencies into the ARCMAP and NFIRS 5 Alive computer programs. With these programs, a picture is developed that identifies those areas of greatest risk and demand for service.

Population density

While assessing risk, population density is one factor that is often considered. The Commission on Fire Accreditation International (CFAI) has established different response time categories for different levels of population density as part of its accreditation process. These categories are:

- Metropolitan – Population over 3,001 per square mile.
- Urban – Population between 2,001 and 3,000 per square mile.
- Suburban – Population between 1,001 and 2,000 per square mile.
- Rural – Population less than 1,001.

The CFAI standards for Metropolitan and Urban areas are the same so for the purpose of this standard of cover document, the FFD will combine these two categories into Urban. PZ 1, 2, 4

and 5 are all considered Urban. PZ 3, 6, 7, and 8 all have population densities that are less than 1,000 people per square mile.

In the case of PZ 3, the population density is distorted by the airport property, which is a large area that has no population. If the population density of the core area of the planning zone is calculated, a population density is found that is significantly higher and falls within the urban category. For planning purposes, PZ 3 will be considered Urban.

PZ 6 is mostly an industrial park with consequently low population. In 2004, the Fargo Fire Department opened Station 6 in that zone because of the large number of industries in the area and their substantial economic value. Though the population density is low enough to be considered rural, the department has chosen to use the minimum response standards for urban areas in PZ 6.

PZ 7 is a growing area. Currently, PZ 7 is considered rural but, the department will establish goals based on the standards for suburban areas.

In sum, Planning Zones 1 through 5 will be viewed as urban, Planning Zone 6 and 7 will be considered suburban, and Planning Zone 8 will be considered rural.

Building risk

The Great Fargo Fire of 1893 consumed most of the City. The oldest existing structures today were built after the fire and in the early 1900's. The downtown area has the oldest commercial buildings; most of which, are of ordinary construction. A large urban renewal project eliminated many of the oldest structures in the downtown area and Renaissance Zone funding has stimulated updating and new construction in the downtown area. Remodeled buildings were, and are, required to be brought up to the most current fire code.

The majority of construction is wood frame. Most residential structures are one or two stories with larger three story multifamily dwellings becoming common in the newer areas. In order to identify specific building risk, the overall number and value of property was evaluated. Within each planning zone, the City of Fargo Assessor's data was used to count all residential and commercial structures along with their total values. The residential structures were broken down into single family, townhouse/condos, apartment buildings less than four units, and apartment buildings greater than or equal to four units. Table 3 shows these properties by planning zone.

Table 3. Value and Number of Residential and Commercial Occupancies by Planning Zone

	Apt, Condos & Twin homes		Single Family		Commercial		
Planning Zone	Number of Units	Value	Number of Units	Value	Number of Units	Value	Total Value
PZ 1	297	$152,062,400	4,951	$527,093,700	350	$546,745,900	$1,256,255,600
PZ 2	620	$391,169,300	8,504	$1,450,115,700	156	$399,321,400	$2,251,256,900
PZ 3	141	$63,929,000	3,602	$480,120,800	89	$157,977,500	$702,395,700
PZ 4	122	$44,758,300	2,555	$241,135,560	262	$263,597,100	$540,234,060
PZ 5	276	$253,088,400	343	$47,261,700	197	$560,511,100	$914,369,500
PZ 6	0	$0	7	$681,000	74	$156,972,100	$157,516,600
PZ 7	59	$75,493,750	1,955	$328,392,800	61	$162,236,000	$580,430,000
PZ 8	114	$4,865,875	1,673	$366,228,600	8	$17,854,900	$425,044,700

This data represented a good overview of single family property within each planning zone. However, a more detailed examination of apartments and commercial property was required for several reasons. For example, newer apartment buildings on the south side of the City are more expensive than older apartment buildings in older sections of the City. Newer buildings are built and maintained to stricter codes and have a lower associated risk. Also, the number of buildings has the drawback of not differentiating between sizes of buildings. For instance, using strictly the number of commercial buildings does not account for the difference in risk between a corner convenience store and a shopping mall.

The value and number of structures were evaluated to clarify the relation between risk and size of buildings. The number and value of the properties within each planning zone was totaled for various sized buildings based on the square footage in the Assessor database. As discussed above, a square footage of 6,500 square feet was theorized to be a valid break point between moderate and high risk. After that level was assessed, buildings were examined on 10,000 sq. ft. increments to look for relations to risk at various size buildings. Table 4 shows these totals.

Table 4. Building Number and Value by Planning Zone

	> 6,500 sq ft		> 10K sq ft		> 20K sq ft		> 30K sq ft		> 40K sq ft	
PZ 1	375	$397,729,800	260	$364,472,600	129	$307,616,300	70	$253,079,800	40	$202,631,900
PZ 2	239	$537,114,500	302	$486,162,200	183	$406,885,400	91	$315,432,800	58	$262,581,400
PZ 3	111	$145,954,000	89	$138,305,800	56	$123,202,600	29	$101,315,600	22	$85,770,500
PZ 4	326	$236,496,800	234	$207,817,500	102	$146,837,900	51	$105,693,100	36	$91,318,500
PZ 5	405	$717,360,800	355	$671,949,100	224	$583,892,800	125	$477,600,800	78	$406,953,800
PZ 6	137	$146,355,500	103	$138,219,500	63	$117,817,100	44	$104,446,500	37	$96,628,900
PZ 7	149	$224,231,000	112	$205,139,100	71	$176,558,500	49	$151,907,100	29	$120,647,000
PZ 8	12	$12,409,500	7	$8,160,600	3	$4,810,600	3	$4,810,600	0	$0

The value of the properties is judged to be less pertinent for the reasons mentioned earlier. The number of properties was judged to have validity for risk. The higher square footages did not appear to add any significant information. It was the consensus of the chief officers of the

department, that 6,500 square feet was a logical dividing line for all occupancies. In buildings smaller than 6,500 square feet, the risk to life and the economy is decreased and those buildings are likely to be one story. Though different arguments could be made for different square footages for different occupancy, 6,500 Sq. ft. was chosen as a reasonable breaking point for all types of commercial and multifamily occupancies. As a means of verifying the legitimacy of this threshold, calculations were made on the total dollar loss due to fire and the number of runs made to these buildings. Of all the structures within the City that are in the assessors database, structures greater than 6,500 square feet make up less than 10% of total. From 2006 through March of 2009, this 10% accounted for approximately 63% of the total fire related dollar loss and 46% of the nonmedical fire runs. Figure 10 is a map showing the buildings with a square footage greater than 6,500 that were deemed high risk buildings.

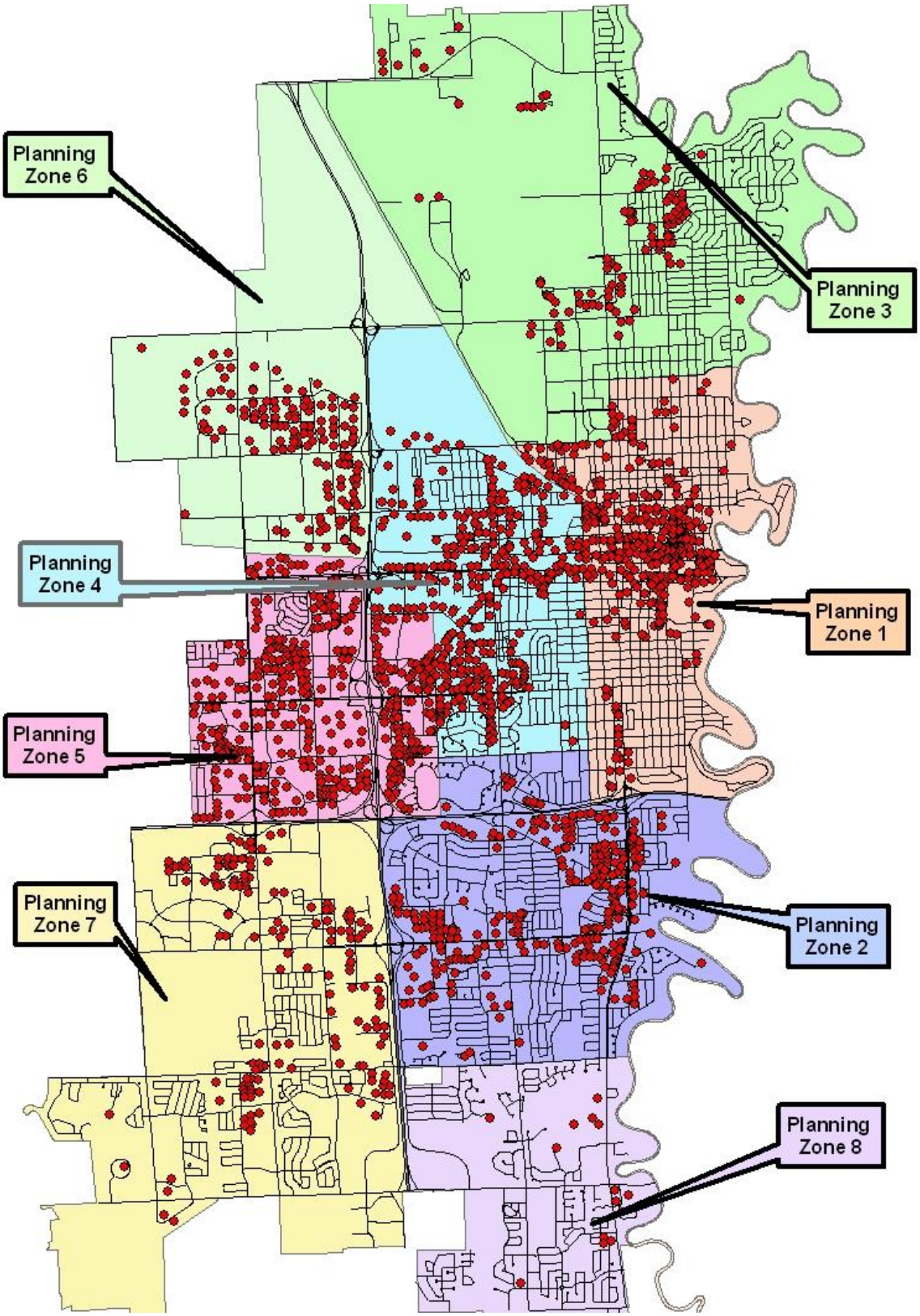


Figure 10. High Risk Buildings 6500 Square Feet and Larger

One weakness to using the high risk buildings as defined is that it does not take into consideration any tax exempt property. While the FFD has fire prevention inspection data on these properties, the City of Fargo Assessor's database does not track much of the information for tax exempt properties. Most public buildings have no pertinent building information available because these building are not assessed. Information on nonprofits such as some hospitals, some nursing homes, churches, and private schools is not available unless the properties were privately owned in the past. Past attempts by the Assessors to allot time to gather the information have not been successful. The tax status is an attribute that can be searched for in ARCMAP. Figure 11 shows all of the tax exempt properties in the City of Fargo. This map will be consulted when specific areas are examined to look for the possibility of additional risk.

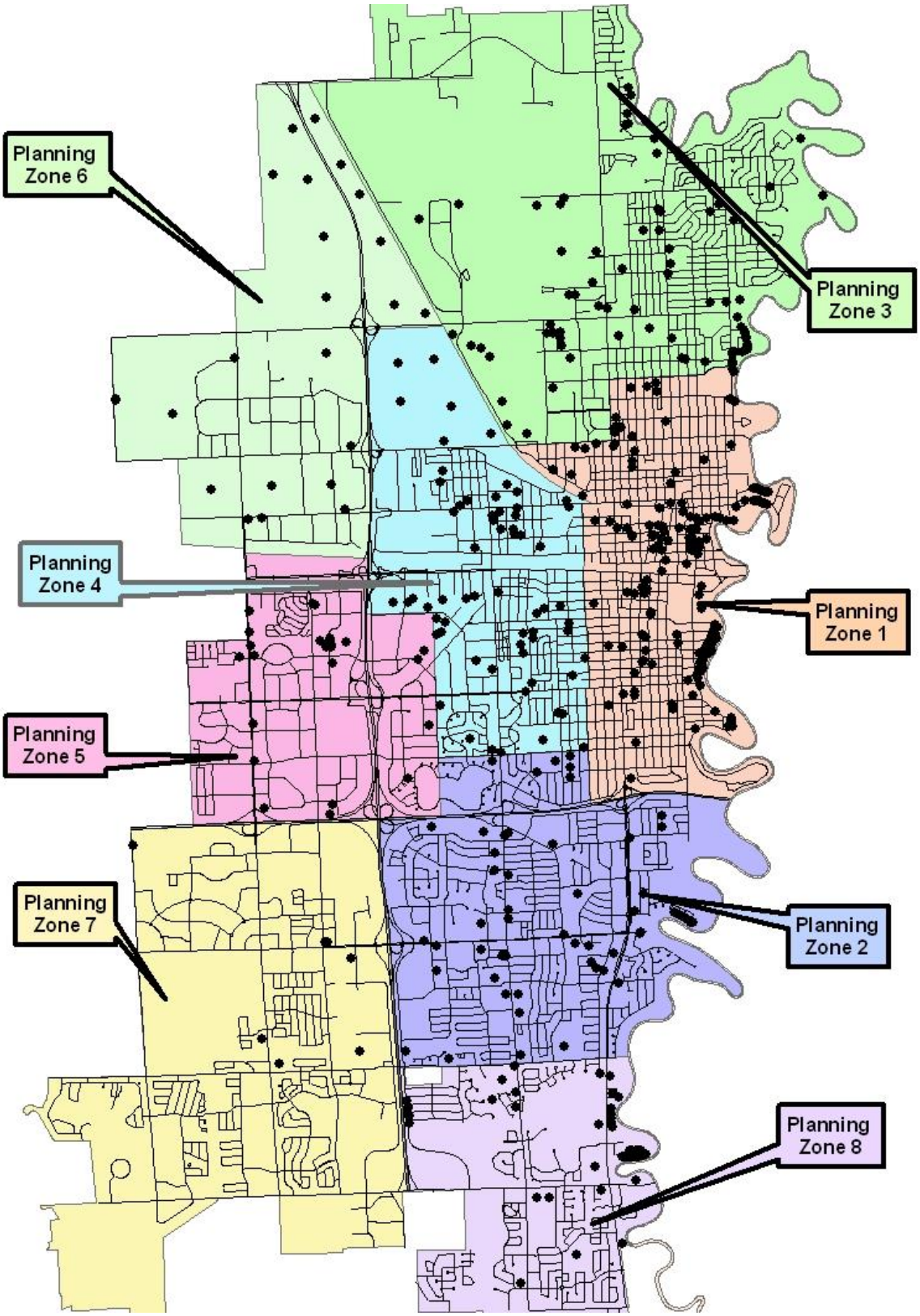


Figure 11. Map of Tax Exempt Properties

In assessing the high risk buildings in Figure 10, it is easy to see the downtown area, in PZ 1, has the greatest concentration of high risk buildings and with the remainder scattered throughout the core of the City. The risk in the north part of the City in PZ 3 is under-represented when the exempt properties are considered. North Dakota State University (NDSU) is located north of 12th Avenue and west of North University Drive. The majority of the 112 buildings on campus are represented in the Assessor database by one exempt parcel. There is a variety of fire risks on the NDSU campus. Only twenty of the buildings are sprinklered. There is a large concentration of students in the dormitories, which are not all sprinklered. Scattered throughout the campus are many different types of hazardous materials of various undocumented quantities. The campus has several large arenas including the Fargo Dome. The Fargo Dome is on NDSU property but is owned by the City of Fargo. It has had crowds up to 27,000 people with events on 90 to 100 days per year and a total attendance of over 400,000 people per year.

It may appear that far south Fargo has a disproportionate number of exempt properties. For instance, there are 45 exempt properties in PZ 8. After a closer examination it was found that 24 of these properties were flood homes, which were removed by the City of Fargo. When those properties are excluded, the proportion of exempt property in that planning zone is comparable to the other planning zones.

Multi-story Buildings

Fargo is not a very "vertical city" with only 69 structures four to six stories tall. There are only 21 buildings over six stories tall 12 of which are in Station 1's response area. Of these, only three are over ten stories; the Fargo High Rise being the tallest at 22 stories. A study of buildings over four stories shows most of the need for the aerial is in the PZ 1. See Table 5

Table 5. Multistory Buildings by Planning Zone

Planning Zone	Bldgs. 4 to 6 Stories	Bldgs. Over 7 Stories
PZ 1	52	12
PZ 2	1	1
PZ 3	5	6
PZ 4	3	0
PZ 5	4	2
PZ 6	4	0
PZ 7	0	0
PZ 8	0	0

Fire Flow

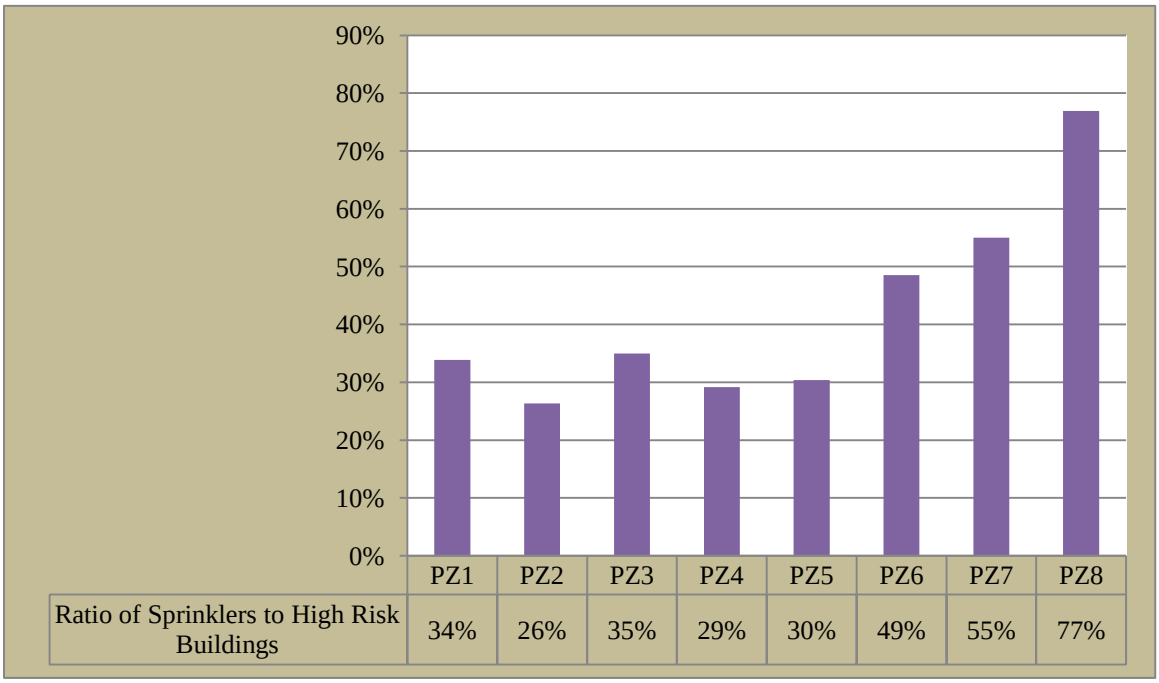
Another important element in a risk assessment is the evaluation of the available water supply for firefighting needs. In 2004, the City of Fargo retained an independent engineering firm, Advanced Engineering and Environmental Services, Inc., to do a detailed analysis of the water distribution system and prepare a water distribution master plan. For the purpose of this risk assessment, the portion of the study which evaluated pressures and capacities in regards to fire protection was examined. Because the Fargo Fire Department uses the International Fire Code to determine needed fire flow, the parameters for the study were based off of these requirements. The study indicated that there was enough total storage within the entire distribution system to

meet the fire protection requirements of 8,000 gpm for duration of four hours. The fire flow analysis indicated that there are 30 hydrants in single family residential areas and 227 hydrants in multi-family/commercial areas that do not meet the requirement of 1,000 gpm for single family homes up to 3,600 sq. ft. and 3,500 gpm for multi-family and commercial property. The bulk of these properties are located in the older sections of the City (primarily PZ 1), which have older six inch cast iron pipe water mains. These mains are on the current water main replacement schedule. A detailed map of these locations is in the Water Distribution Master Plan Document. Also, based on the ISO survey dated 2/28/2000, the City scored 38.17 out of a possible 40 for water supply. This translates to a Class 1 rating for water supply.

Based on the results of the water distribution study along with the current hydrant maintenance plan, the FFD is confident that the City water distribution system is sufficient for firefighting needs. Although there are isolated areas with lower than required needed fire flow (NFF), the FFD considers this to be a very small percentage of the community and does not feel it is of significant risk (Advanced Engineering and Environmental Services, Inc., 2004).

Fire Suppression Systems

Fire suppression sprinkler systems are important factors in reducing risk. The Fargo Fire Department tracks the location of all sprinklered buildings in the City. Unfortunately, this database cannot be combined with the City Assessor's data to determine directly the number of high risk buildings that are either sprinklered or not. To approximately gage the impact of sprinklers, the number of sprinklered buildings in each planning zone was compared to the number of high risk buildings. This ratio was put in a percentage format for the comparison of planning zones. Figure 12 shows the percentage of each planning zone.



	PZ1	PZ2	PZ3	PZ4	PZ5	PZ6	PZ7	PZ8
Ratio of Sprinklers to High Risk Buildings	34%	26%	35%	29%	30%	49%	55%	77%

Figure 12. Percentage of Sprinklered High Risk Buildings by Planning Zone

The chart demonstrates PZ 1, 2, 4 and 5 have proportionally fewer sprinklered buildings. PZ 6, 7 and 8 have a greater percentage of new buildings which were built to stricter fire codes and are therefore more likely to have sprinkler systems. This is the most reasonable explanation for these planning zones higher percentages. PZ 3 was adjusted to include NDSU's buildings. These were not in the original database but were added to more accurately reflect the risk.

Non-Fire Risks

Transportation

Like most commercial centers, Fargo is a transportation center. The City is at the crossroads of two interstate highways, has an international airport and two major rail lines. Commercial passengers are served through four major airlines as well as Amtrak and Jefferson Bus Lines. As a transportation center, there is risk from mass casualty incidents as well as a significant risk from hazardous materials transportation.

The two rail lines are major arteries that carry from 40 to 70 trains per day. A large percentage of these are coal trains but several trains per day carry a wide variety of chemicals especially chemicals associated with agriculture such as anhydrous ammonia. These trains cross through PZ 1, 4, 3, 5 and 6.

The two interstate highways cross or border all of the planning zones in Fargo except for PZ 3. I-94 runs east and west through the City. It crosses the Red River on the border of PZ 1 and PZ2. The bridge over the river has been the site of many vehicle crashes but recently had a de-icing system installed which made the bridge safer. I-29 runs north and south through the City. Both interstates have large numbers of over the road trucks carrying hazardous materials that pass through the City daily.

The Hector International airport and North Dakota Air National Guard Base (NDANG) are located within the City. The airport and NDANG are approximate to each other and share the same runways. Each has a risk of an aircraft disaster of some type. The NDANG has its own fully staffed 24 hour fire department and provides the primary fire protection for the Guard Base and all military as well as all domestic aircraft emergencies. The FFD provides the primary fire protection for the Hector International Airport terminal as well as other privately owned facilities located on or near airport property. The FFD does have a mutual aid agreement with the NDANG and responds to assist with incoming aircraft emergencies. The Guard Base and Hector terminal are located within PZ 3.

Pipelines

Two pipeline corridors run through the City. These carry refined petroleum products such as gasoline, fuel oil, and jet fuel. The pipelines cross the river in PZ 2 and cross PZ 2, 5 and 6. One corridor carries a six inch and a ten inch pipeline. The other right of way has one ten inch pipeline.

Terrorist Threats

A threat assessment of potential terrorist targets was completed in 2002. A significant number of potential targets have been identified within the City. Fargo, on a national level, is not considered a likely terrorist target but as a regional center with gatherings of large number of

people, it does have some risk. The Federal Court House has been the site of a number of high profile cases in the past few decades. The Fargo Dome regularly sees large crowds of people. The West Acres Shopping Mall is a regional shopping destination. North Dakota State University recently received protest over their handling of animals. Though none of these are major concerns on a national level, they are the most important terrorist targets in the City of Fargo and, as such, have some associated risk.

Rivers & Lakes

Because of the flat terrain, there is an annual threat of flooding. The Red River of the North borders the entire eastern side of the City of Fargo. The Red River is unique in the fact that it flows north into the ice and colder temperatures. The City is located between two other rivers that join with the Red. The Wild Rice River joins the Red River approximately two miles south of Fargo and the Sheyenne River joins the Red River approximately five miles north of the City. The Wild Rice is a much smaller river but during the spring it carries almost as much water as the Red. In addition, when the Sheyenne River exceeds 22 feet it breaks out and spills into the Wild Rice River increasing the level of flooding in Fargo. Ice jams on any of these three rivers has a significant impact on the severity of flooding. During normal river conditions the rescue potential is low risk but significant flooding is considered high risk in the fact that there is the potential for large scale rescues in the event of a levee breach. Various levels of evacuation & contingency plans have been developed for such an event. Flooding is also considered high risk because of the potential to cause significant damage to property and to the economy. (The most recent significant floods are described under Natural Disasters.)

The Red River has some recreational traffic including fishing, boating, and kayaking near the man made dams, which depending on the water flow can produce a significant boil and have been the source of water accidents. During the winter unstable ice conditions pose a risk. The river is the major source of water for both Fargo and Moorhead therefore, is vulnerable to a chemical spill with potential consequences beyond normal environmental concerns. A hazardous materials spill in the Red River could be a serious incident that could demand considerable resources for a substantial amount of time. The river borders PZ 1, PZ 2, PZ 3, and PZ8.

Located within the City are small man-made lakes and water containment areas. The lakes are located within residential areas and pose the typical water related risks. The lakes are primarily for cosmetic purposes, small non-motorized watercraft can be used but there is very little recreational activity. While there is always the possibility of an accident, to date there has not been any calls for service related to the lakes. During severe thunderstorms and spring flooding, water containment areas and drainage canals are often at full capacity. There have been calls for service involving these areas; typically they involve motorized vehicles. The bulk of these lakes and containment areas are located within PZ 2, PZ7, and PZ 8.

Hazardous Materials

Hazardous materials have proved to be a challenge for most fire departments. Along with the risk from hazardous chemicals as a transportation center, there are many sites in the City that have sizeable amounts of hazardous chemicals stored and used on site. The department inspects all commercial buildings and tracks the amount of hazardous materials stored in all buildings. The department does not have an efficient means of integrating that information into computer

programs used in this analysis. One means of locating businesses that use or store chemicals is through The Superfund Amendments and Reauthorization Act (SARA), which requires all businesses to report to state and local officials substantial quantities of hazardous chemicals stored on the premises. The quantities vary based on the type of the chemical and the type of facility. With the new CAD/RMS programs, the data from fire prevention inspection will more easily be integrated with other information. Though the quantities and types are not available for analysis with the present system, the location of all businesses with reportable amounts of chemicals can be viewed with ARCMAP. Figure 13 is a map showing the businesses that have SARA reportable quantities of chemicals. The majority of these are in PZ 1, PZ 4 and PZ 6. With data and experience from fire inspections, the department knows that the major areas of concern for hazardous materials use and storage are in PZ 4 and PZ 6. These areas have the most concern because of the manufacturing and storage facilities that populate the industrial park areas located in these two planning zones. Fargo does not have any large chemical manufacturing. Figure 13 is a map depicting businesses with SARA reportable amounts of hazardous chemicals. It also identifies the locations of pipelines, railroads, and interstate highways in relation to planning zones.

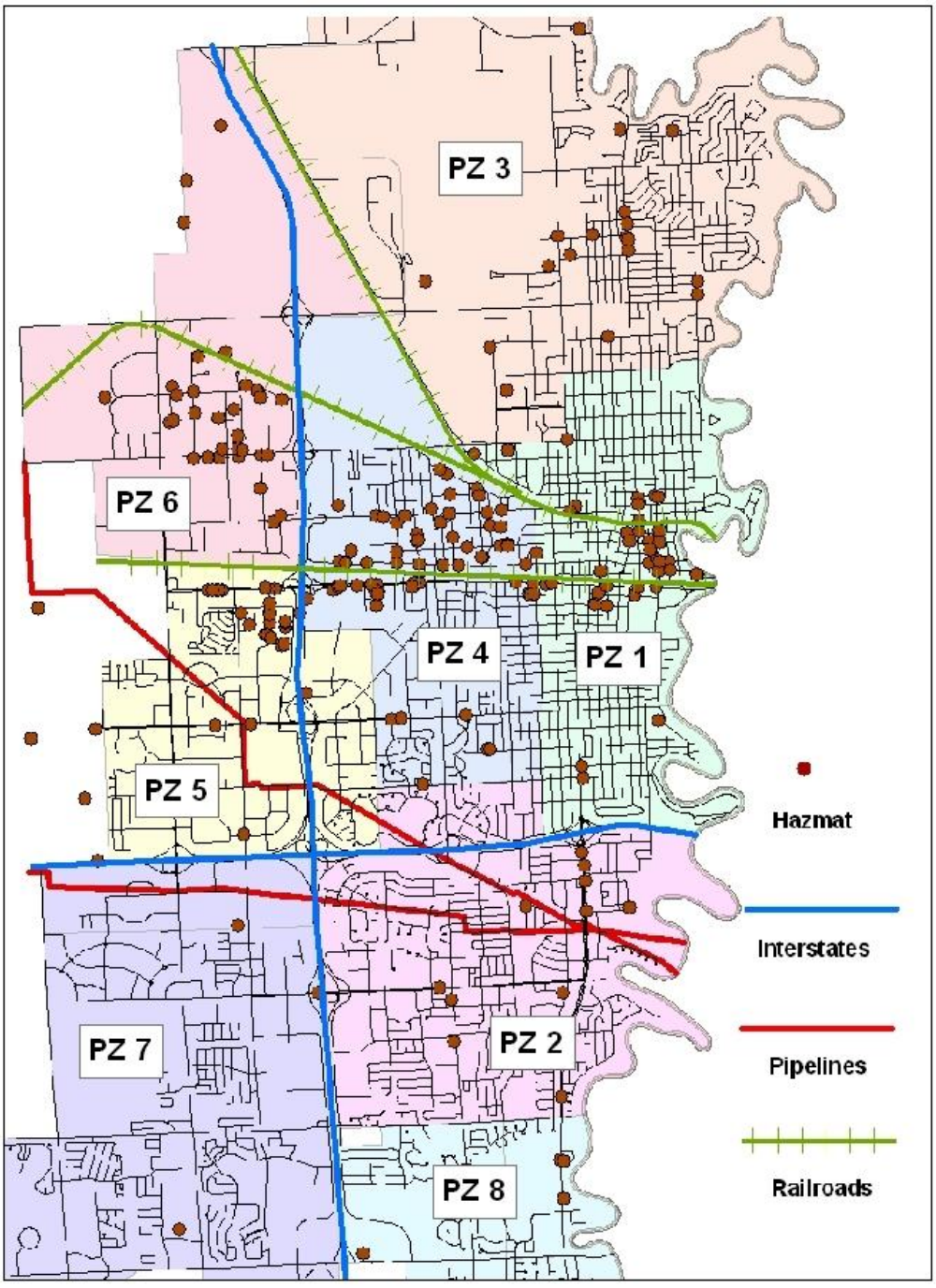


Figure 13. Map Showing Businesses with SARA Reportable Quantities of Chemicals

Natural Disasters

Potential natural disaster risks primarily include springtime flooding, summer thunderstorms, tornadoes, and winter blizzards and snowstorms.

During recent years, the Red River of the North has passed into flood stage at least once per year. During most years, flooding is minor. However, about every decade the City experiences a devastating flood. Until recently the Red River flood of 1997 had been the most severe flood of the river since 1826. On April 17th 1997, the Red River crested in Fargo at 39.5 feet which is 22 feet above flood stage; at that time the second highest crest in recorded history. While there were some properties lost to flooding, dike-building efforts were able to prevent the water from flooding into a majority of the City. Since 1997 efforts have been made to lessen the effects of severe flooding within the City. However, because of the lack of federal support no permanent flood protection has been put in place. On March 28, 2009 the Red River crested at 40.8 feet, making it the highest recorded flood in Fargo's history. This was considered a level one disaster bringing in many Federal and State resources. Because of the outpouring of volunteers and the efforts of all the agencies involved, temporary levees and dikes were built to the 43 foot level resulting in flood damage to the City being held to a minimum.

Severe thunderstorms and tornados are potential disaster risks of summer. Most thunderstorm activity occurs in June, July, and August with August being the most active month. Fargo averages 35 thunderstorms per year. According to the National Weather Service, between 1978 and 2008, in Cass County there were 204 thunderstorms with high wind events; high wind events are defined as 58 mph or greater. During this same time period there were 288 hail events ¾ inch or larger. Tornados are an ever present threat associated with thunderstorms. Fargo suffered severe loss of life and property damage when struck by an F5 tornado on June 20, 1957. Tragically, 10 people lost their lives due to the tornado. Damage estimated at $198.16 million (2008 USD). In the time period from 1978 to 2008 there were 49 tornadoes in Cass County, 34 were F0, 11 were F1, and 4 were F2. There were no F3 or higher in that time period (Ewens, 2009).

The City is known for its long cold snowy winters and blizzard conditions. Heavy snow accumulation has caused roofs to collapse and during blizzards snow blocked streets makes travel with fire trucks difficult. Double digit sub-zero winter temperatures require precautions to maintain an effective water supply. Annual hydrant inspections, pumping water out of hydrant barrels that do not drain, and the addition of antifreeze helps minimize frozen hydrants. Apparatus and fire ground operations are adapted to help deal with the frigid temperatures. The FFD has a good working relationship with the street department and during blizzard events, the Street Department responds quickly at our request to open blocked streets.

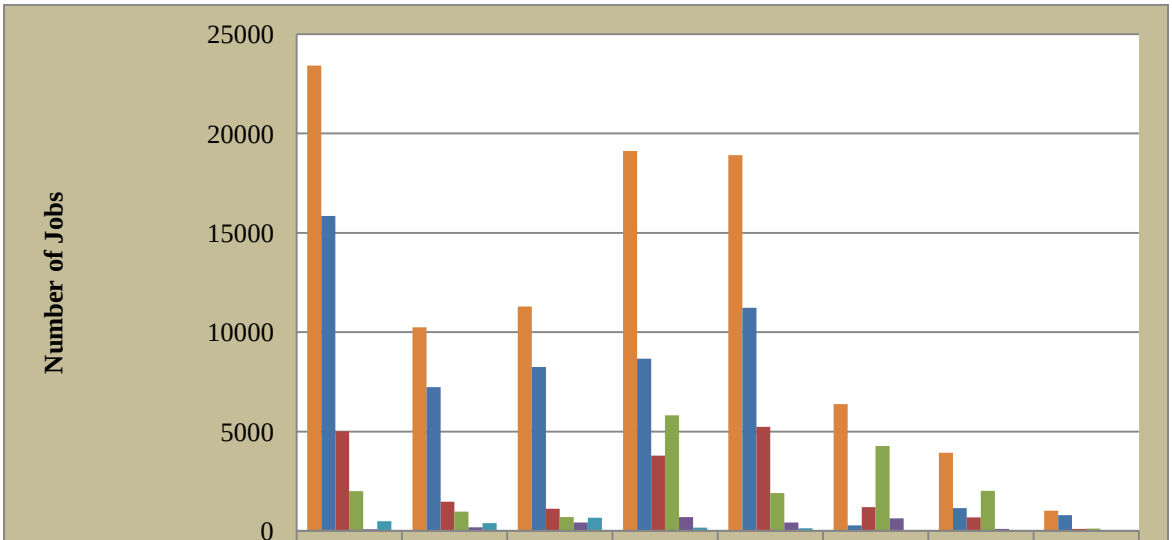
Economic Risks

The Fargo Fire Department considers the protection of the economy a primary strategy in planning for fire protection. One means of assessing risk to the economy is an assessment of jobs. In table 6 are the ten largest employers in the City of Fargo.

Table 6. City of Fargo's Largest Employers

Sanford Health Medical Center	6,914
North Dakota State University	5,975
Blue Cross Blue Shield of North Dakota	1,800
Fargo Public Schools	1,638
Essentia	1,285
US Bank Service Center	952
Microsoft	948
Fargo VA Medical Center	830
City of Fargo	731
Phoenix International Corp.	634

The Fargo Moorhead Metropolitan Council of Governments (Metro COG) assembles census data for each specific area of the City to determine traffic patterns for the metropolitan area. It breaks the information into small parcels that make it easy to assign specific information to specific areas, such as planning zones. The census data provides the number and type of jobs for each particular area. Figure 14 shows the total number jobs and the number of service, retail, manufacturing, transportation/warehouse and other jobs in each planning zone.



	PZ 1	PZ 2	PZ 3	PZ 4	PZ 5	PZ 6	PZ 7	PZ 8
Total	23411	10243	11286	19119	18903	6371	3935	1008
Service	15846	7235	8241	8667	11226	266	1151	786
Retail	5004	1473	1109	3781	5236	1195	676	98
Manufacturing Jobs	1995	971	686	5815	1897	4262	2016	107
Trans & Whouse	88	177	411	687	422	632	89	3
Other	478	387	657	169	122	16	3	14

Figure 14. Number of Jobs by Planning Zone

From this chart it is apparent that PZ 1, 4, 5 have the highest number of total jobs. However, not all jobs have the same economic value. Generally, manufacturing jobs are considered to have more economic value than other types of jobs because the types of industries with manufacturing

jobs tend to create other supporting businesses, which in turn create other jobs. There is no definitive information that directly compares the economic value of different job sectors, but this has been a basic assumption the Fargo Fire Department uses in planning, and was accepted by the City Commission as valid. Figure 15 shows the number of manufacturing jobs in each planning zone.

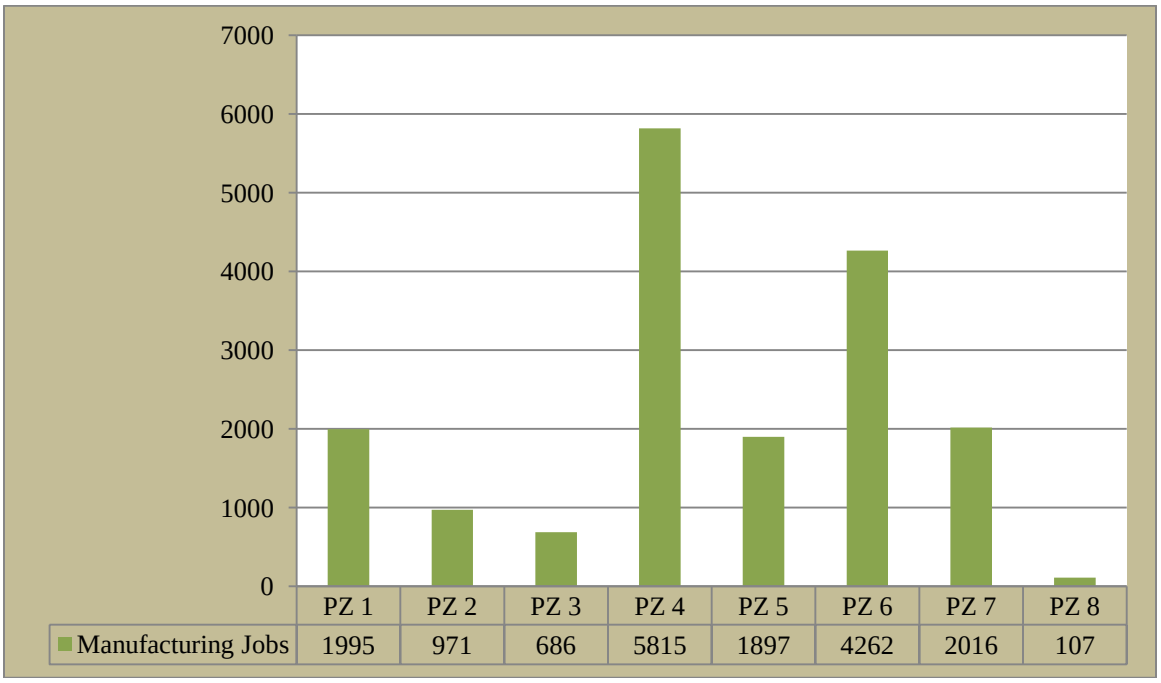


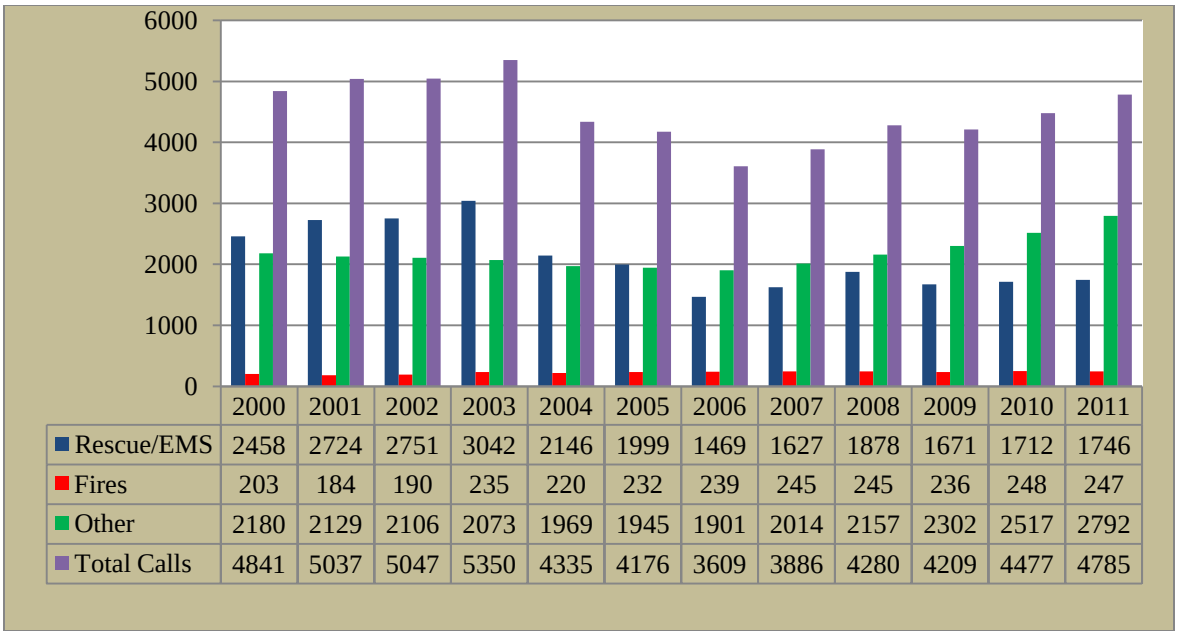
Figure 15. Manufacturing Jobs per Planning Zone

This chart shows a significant number of manufacturing jobs in Planning Zones 4 and 6. This information was an important factor in planning for Station 6.

Demand for Service

Total calls for service

Combined with the level of risk, an analysis of demand for service is important to assess the need for fire suppression resources. First, an overview of the number and types of incidents in the entire jurisdiction is useful to see the general demands on the fire protection system.
Figure 16 shows the number and type of calls per year.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rescue/EMS	2458	2724	2751	3042	2146	1999	1469	1627	1878	1671	1712	1746
Fires	203	184	190	235	220	232	239	245	245	236	248	247
Other	2180	2129	2106	2073	1969	1945	1901	2014	2157	2302	2517	2792
Total Calls	4841	5037	5047	5350	4335	4176	3609	3886	4280	4209	4477	4785

Figure 16. Total Calls for Service 2000-2011

The FFD provides BLS medical service. Personnel are required to be trained to and maintain the EMT-B (basic) certification level. The FFD does not provide patient transport. The local privately owned ambulance service FM Ambulance provides the primary ALS care and patient transport.

Prior to 2003 the FFD responded to all medical assist calls regardless of the nature of the call. The FFD staff reviewed the response records and determined that the FFD was having an insignificant impact on the non life threatening EMS calls. In 2003 Priority Dispatching was implemented. The FFD determined that this type of dispatching would eliminate calls where we do not have a positive impact, therefore increasing unit reliability. This type of dispatching resulted in a drop of 896 EMS responses in 2004. In 2005 the medical dispatching protocols were updated again, this resulted in another drop in the total number of EMS calls. The number of total EMS calls in 2006 was approximately 50% less than 2003. Since then EMS calls have risen.

Calls by occupancy type

In order to identify any trends, it is also important to look at where calls for service occur. Table 7 is a breakdown of total calls for service by occupancy type for 2011. Table 8 illustrates all the fires by occupancy type and table 9 shows just structure fires.

Table 7. 2011 calls by Occupancy Type

Total of Calls by Occupancy Type 2011	EMS	Fire	Other
429 Multifamily dwellings	607	73	986
419 1 or 2 family dwelling	349	30	450
963 Street or road in commercial area	172	17	87
962 Residential street, road or residential driveway	79	11	106
965 Vehicle parking area	41	35	42
311 24-hour care Nursing homes, 4 or more persons	92	0	135
599 Business office	18	1	49
449 Hotel/motel, commercial	27	3	49
161 Restaurant or cafeteria	26	4	25
331 Hospital - medical or psychiatric	10	3	68
961 Highway or divided highway	36	4	19
460 Dormitory type residence, other	5	0	102
960 Street, other	3	2	7
241 Adult education center, college classroom	4	3	42
700 Manufacturing, processing	13	3	29
322 Alcohol or substance abuse recovery center	37	2	21
131 Church, mosque, synagogue, temple, chapel	3	3	20
162 Bar or nightclub	21	0	10
340 Clinics, doctors offices, hemodialysis centers	9	0	28
Other	194	53	517

Table 8. All Fires by Occupancy 2011

All Fires 2011	Fires
429 Multi-family dwellings	73
965 Vehicle parking area	35
419 1 or 2 family dwellings	30
962 Residential street, road or residential driveway	11
938 Graded and cared-for plots of land	5
963 Street or road in commercial area	17
931 Open land or field	4
161 Restaurant or cafeteria	4
579 Motor vehicle or boat sales, services, repair	0
700 Manufacturing, processing	3
881 Parking garage, (detached residential garage)	7
322 Alcohol or substance abuse recovery center	2
981 Construction site	1
951 Railroad right of way	2
549 Specialty shop	0
946 Lake, river, stream	0
919 Dump, sanitary landfill	0
460 Dormitory type residence, other	0
141 Athletic/health club	0

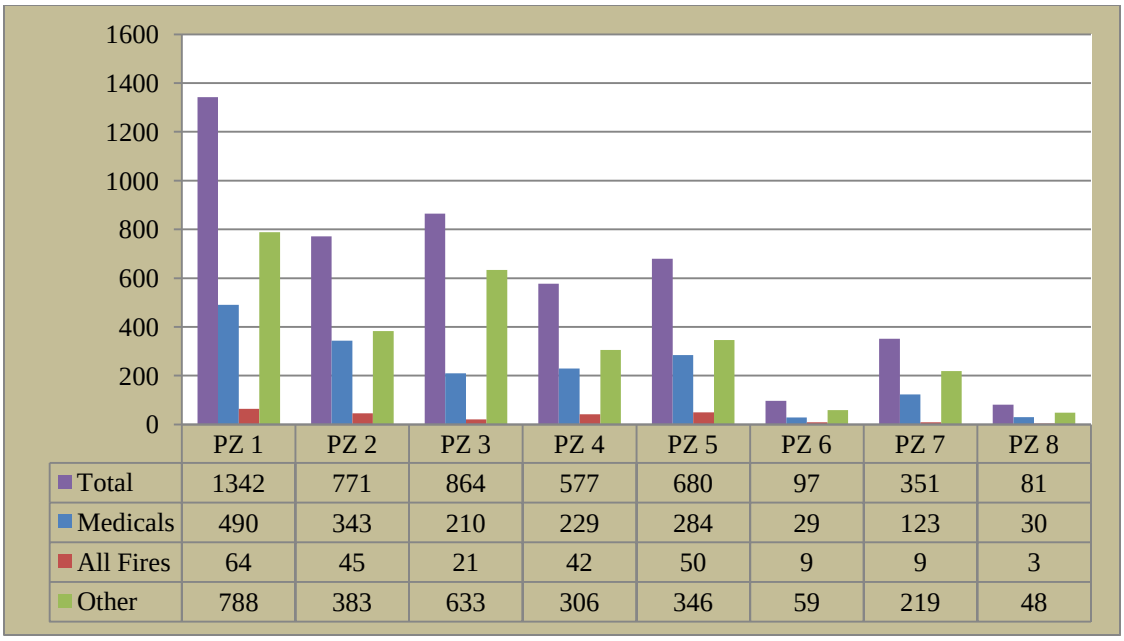
Table 9. Structure Fires by Occupancy 2011

Structure Fires 2011	Fires
429 Multi-family dwellings	29
419 1 or 2 family dwelling	19
881 Parking garage, (detached residential garage)	6
700 Manufacturing, processing	2
579	0
965 Vehicle parking area	0
322 Alcohol or substance abuse recovery center	1
161 Restaurant or cafeteria	1
160 Eating, drinking places	0
581 Department or discount store	0
449 Hotel/motel, commercial	0
241 Adult education center, college classroom	1
549 Specialty shop	0
460 Dormitory type residence, other	0
141 Athletic/health club	0
981 Construction site	0
564	0

By looking at the chart for structure fires, in 2010 the location of structure fires breaks down basically into three categories similar to the break down from 2008. Roughly 1/3 of the fires took place in multifamily dwellings, 1/3 single family, and 1/3 in commercial. This indicates there is not one specific type of occupancy that had a disproportionate amount of fires.

Calls by planning zone

A more thorough look at the individual planning zones allows for a better appraisal of demand for service. Incident data for the last three years has been added to the summary for each planning zone. For the ease of comparison, only 2010 data was used in the following graph to demonstrate the demand in the planning zones. Figure 17 shows the total number of incidents along with the number of medical calls, the number of fires, and the number of other calls for each planning zone. Graphs for the three previous years are similar, though all of the planning zones have shown a gradual increase in calls for service over the last three years. The graphs for all three years are included in the planning zone summaries located on pages 41 – 48.



	PZ 1	PZ 2	PZ 3	PZ 4	PZ 5	PZ 6	PZ 7	PZ 8
Total	1342	771	864	577	680	97	351	81
Medicals	490	343	210	229	284	29	123	30
All Fires	64	45	21	42	50	9	9	3
Other	788	383	633	306	346	59	219	48

Figure 17. 2011 Calls by Planning Zone

From the chart, it can be seen that PZ 1 has the greatest number of calls. PZ 2, 3, 4 and 5 all have similar numbers to each other. PZ 6 and 8 have relatively low numbers of incidents. Most of the planning zones have similar percentages of medicals that range between 40% and 45% with variations from year to year. The exceptions is PZ 6 where the percentage is consistently lower than the other stations as a result of the fact that PZ 6 is mostly industrial and has a low population base.

Aerial Responses

The FFD has one aerial ladder (821) which is located in Station 1 in the downtown area. Though the downtown area still has the greatest need for aerial coverage because of the older multistory buildings, consideration should be given to relocating the aerial coverage in order to improve response time. 72% of the buildings four or more stories are located in PZ 1. These are the buildings where there is the greatest likelihood of the aerial being needed. Relocating the aerial to a site to the west of the current location would improve aerial response times to other areas of the City but maintain satisfactory coverage in the downtown area.

Based on the results of a review done on the actual use of the aerial device, at this time the FFD does not consider the deployment of an additional aerial necessary. The time period from 2002 until 2008 showed the aerial was used a total of 24 times on incidents however, the time period from 2006 to 2008 reflects more accurate record keeping. During that time frame, the aerial was used on 16 incidents. Of those, the use of the aerial was considered to be important nine times. Five times it was considered to be useful but not important to the incident or the incident was not considered important. These were incidents such as extinguishing a large number of burning hay bales and removing a piece of aluminum siding that was a potential danger to the public. The aerial was used two times to help the police remove a suspect from the roof of a building. Two of the incidents where the aerial usage was considered important were mutual aid assists to the West Fargo Fire Department. In 2009, the aerial device was used four times.

Given a history of limited need, the department does not believe a second aerial is justified at this time. If a major event occurs, the standby aerial could be put into service and Moorhead Fire and Rescue has an aerial that is available through a mutual aid agreement. There is a concern about the long response times of the aerial to the periphery of the City. To mitigate this concern, the department has longer than recommended ladders on all front line engines. All engines and the Special Operation Truck carry 35 foot extension ladders. Another plan to improve response times is to move the aerial to Station 4, which is more centrally located. This plan is dependent on the remodeling of Station 2 to accommodate the Special Operations Truck. The City leaders have agreed to the plan in principle but no time line has been established. The department will continue to monitor the aerial usage and explore means to improve utilization of the aerial. More detailed recommendations for relocating the aerial is discussed in the Strategic Plan.

Rescues

The number of calls classified as rescues by planning zone is similar to the total number of incidents. The majority of these calls are removal of victims from stalled elevators and auto extrications. The relatively high number of rescues in PZ 1 includes elevator calls, which come from two or three buildings in the downtown area. Besides elevator calls and auto extrications, other types of rescues that are generally considered more serious and demand more resources do not impact demand for service in any of the planning zones. Figure 18 displays a breakdown of rescues by planning zone.

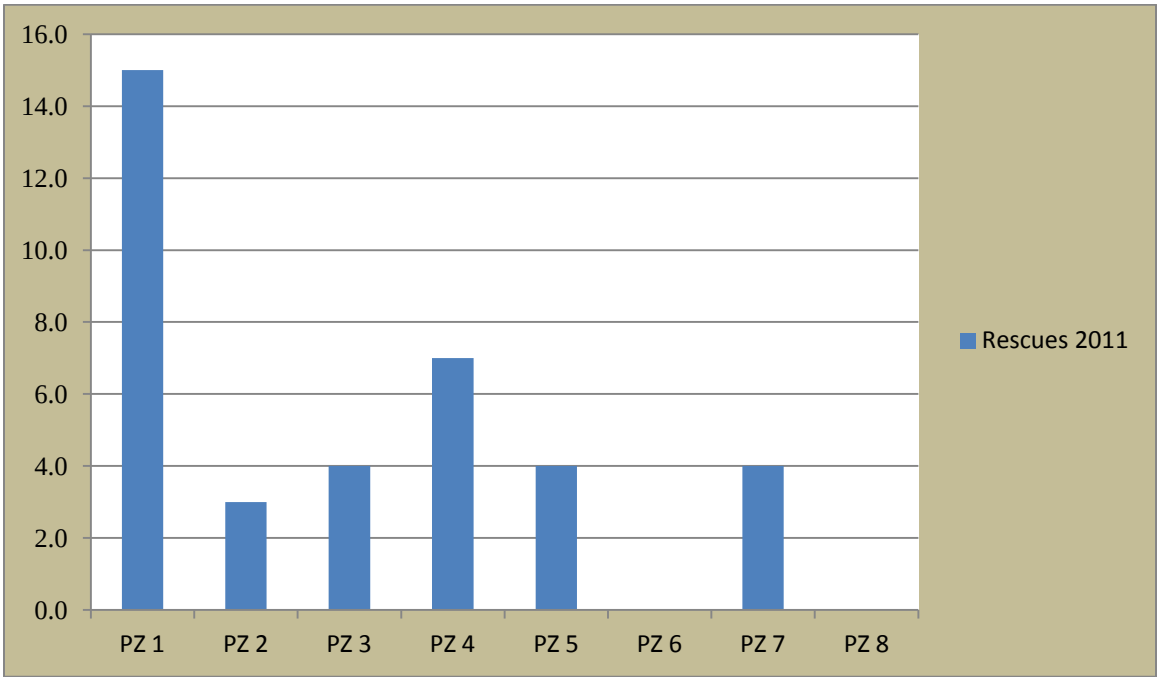


Figure 18. Rescues by Planning Zone

Hazmat Incidents

Another element examined during the risk assessment was the evaluation of hazardous materials incidents. The average numbers of hazardous materials calls in each planning zone are depicted in Figure 19.

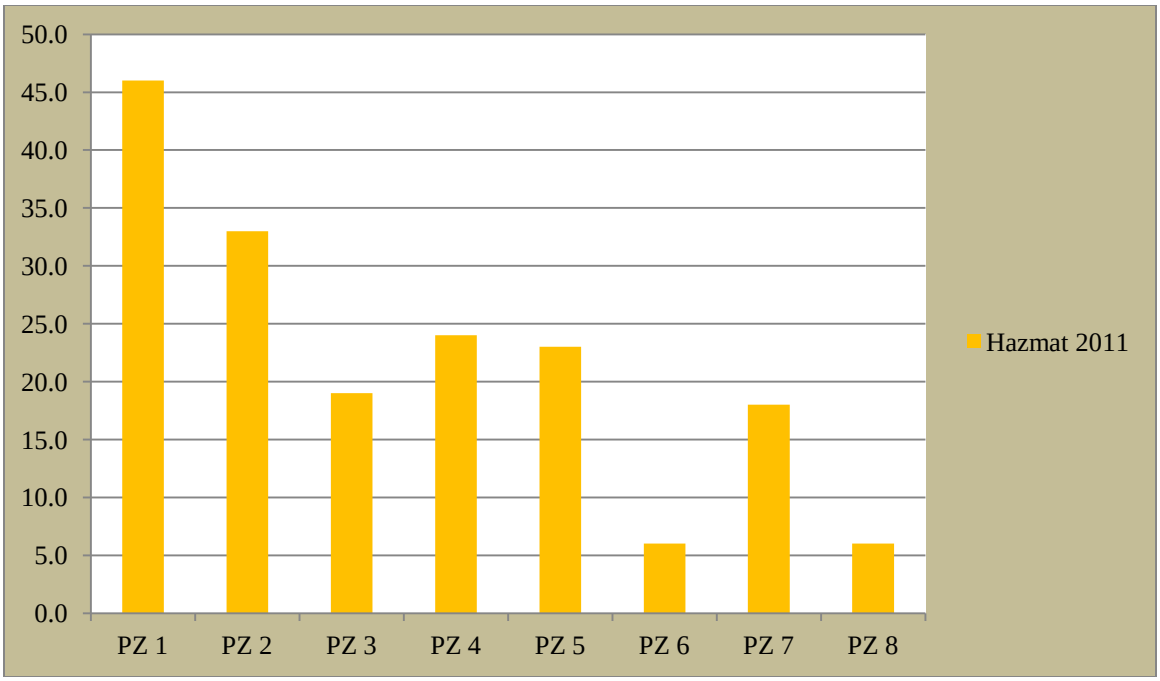


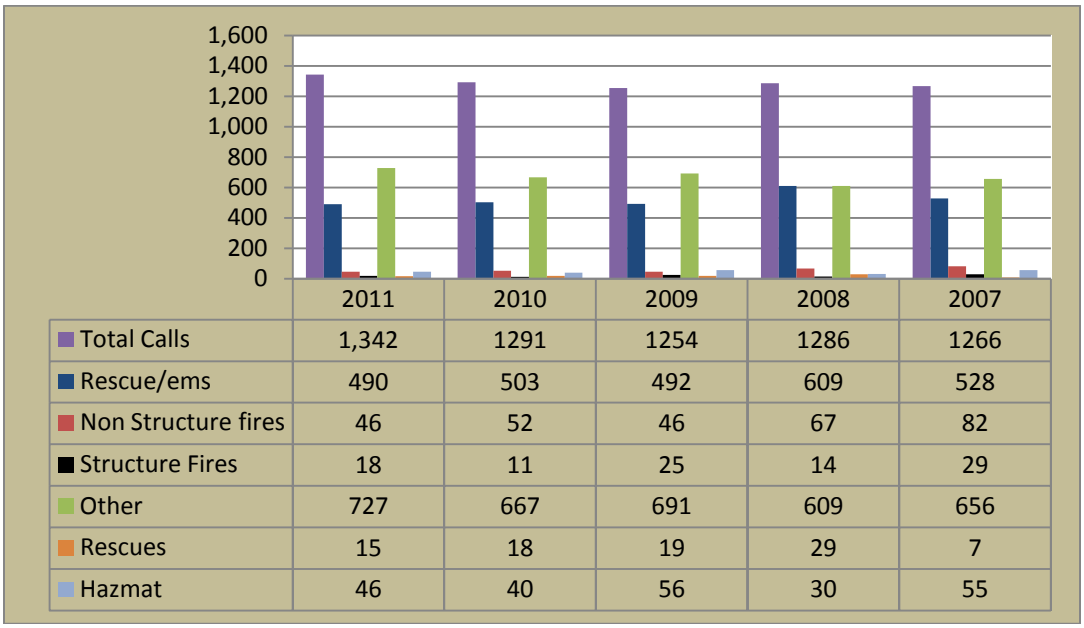
Figure 19. Number of Hazmat Incidents by Planning Zone

Approximately half of these incidents are natural gas lines that are hit during construction and one quarter are carbon monoxide incidents. There are few if any significant hazardous materials responses on an annual basis. These numbers do not count the number of hazardous material investigations with no release or carbon monoxide detector malfunctions.

Summary of Risks per Planning Zone

The information on the following eight pages is a summary of risks by planning zone.

PZ 1



	2011	2010	2009	2008	2007
Total Calls	1,342	1291	1254	1286	1266
Rescue/ems	490	503	492	609	528
Non Structure fires	46	52	46	67	82
Structure Fires	18	11	25	14	29
Other	727	667	691	609	656
Rescues	15	18	19	29	7
Hazmat	46	40	56	30	55

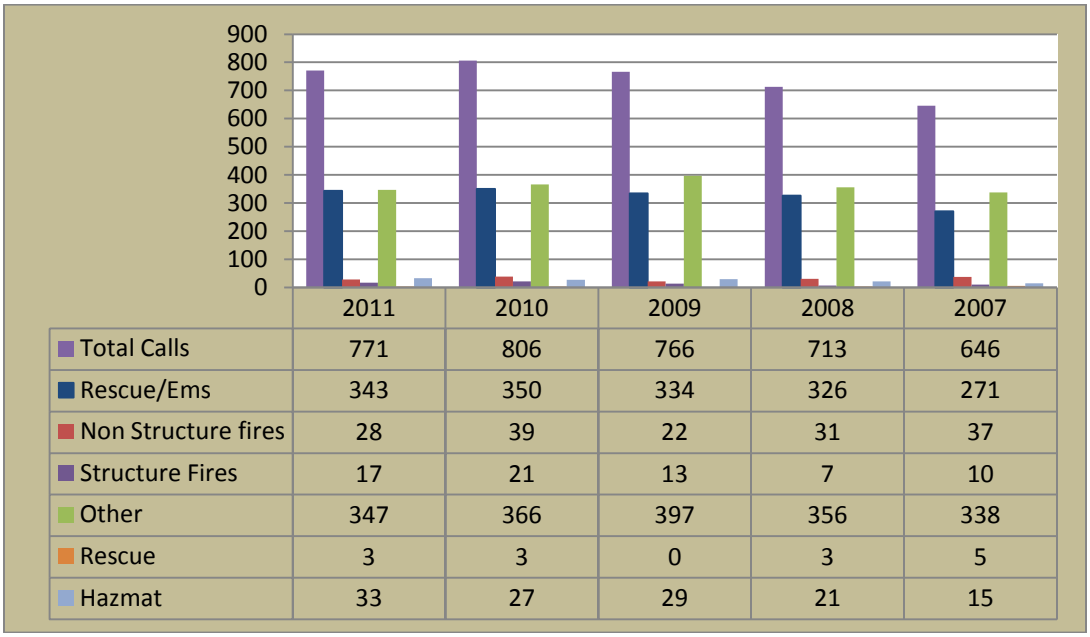
Risks Factors

- 2005 population density of 5,796 people per square mile.
- 410 high risk buildings – second highest number of any planning zone.
- 12 buildings seven or more stories in height.
- 52 buildings four- six stories in height.
- 5,144 single family houses.
- 19 high risk buildings outside 1.5 mile travel along South University between 13 Ave. So and I-94.
- Low ratio of sprinklered buildings to high risk buildings.
- 42 buildings with reportable amounts of hazardous materials.
- Two railroads pass through the zone.
- Borders I-94.
- Red River of the North travels the length of the east border.
- Highest number of incidents of all types of any planning zone.

Risk Diminishing Factors

- No peripheral areas with significant delay in secondary and tertiary responses.

PZ 2



	2011	2010	2009	2008	2007
Total Calls	771	806	766	713	646
Rescue/Ems	343	350	334	326	271
Non Structure fires	28	39	22	31	37
Structure Fires	17	21	13	7	10
Other	347	366	397	356	338
Rescue	3	3	0	3	5
Hazmat	33	27	29	21	15

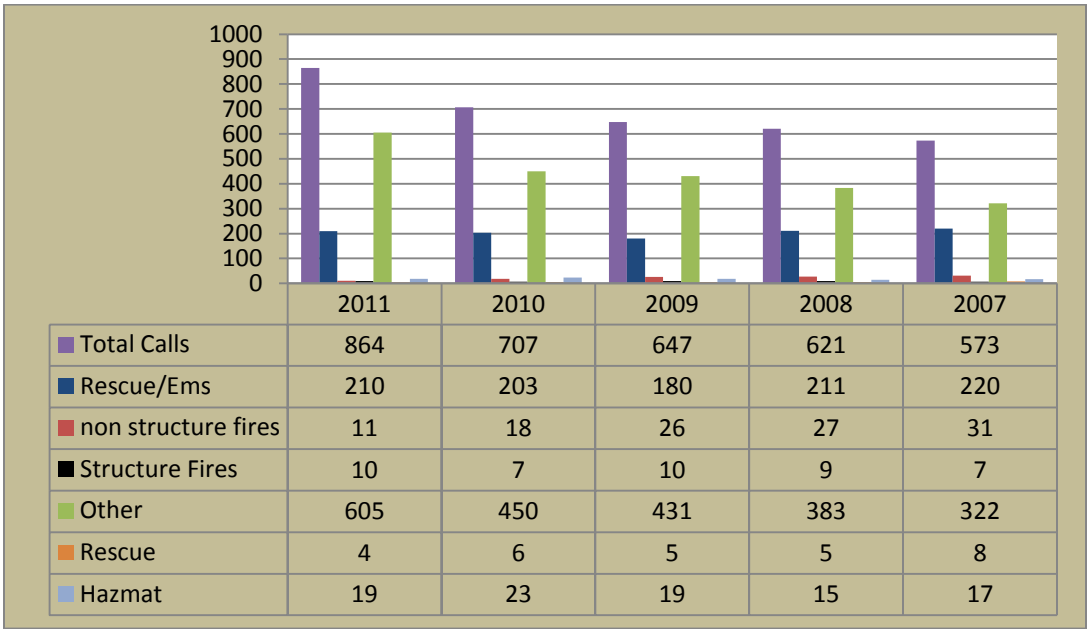
Risk Factors

- 2005 population density of 4,131 people per square mile.
- 284 high risk buildings.
- One building seven or more stories in height.
- One building four- six stories in height.
- 5,452 single family houses.
- 19 high risk building outside 1.5 mile travel distance along S. University Dr between I-94 and 25th Ave. So.
- Low ratio of sprinklered buildings to high risk buildings.
- 13 buildings with reportable amounts of hazardous materials.
- Three petroleum pipelines cross the Red River and traverse the rest of the zone.
- Borders I-94 and I-29.
- Red River travels the length of the east.
- Second highest number of incidents of all planning zones.
- Peripheral areas with potential delay in secondary and tertiary responses.

Risk Diminishing Factors

- Low number of manufacturing jobs.
- Low number of building with reportable amounts of hazardous materials.

PZ 3



	2011	2010	2009	2008	2007
Total Calls	864	707	647	621	573
Rescue/Ems	210	203	180	211	220
non structure fires	11	18	26	27	31
Structure Fires	10	7	10	9	7
Other	605	450	431	383	322
Rescue	4	6	5	5	8
Hazmat	19	23	19	15	17

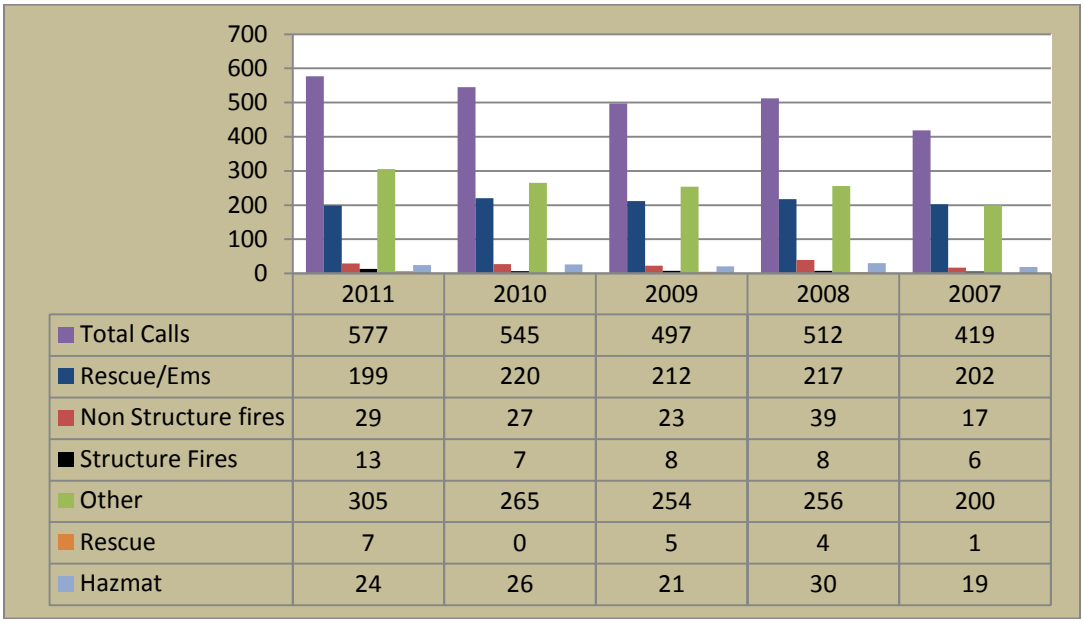
Risks Factors

- 2005 population density in its core area of 3,574. This excludes the airport property and sewage lagoons in the calculation.
- 112 high risk buildings but this does not reflect NDSU.
- Six buildings seven or more stories in height.
- Five buildings four- six stories in height.
- 3,716 single family houses.
- NDSU campus with significant number of people, high risk building and hazardous chemicals. Substantial portion of NDSU campus at edge of or beyond 1.5 mile travel distance.
- Low ratio of sprinklered buildings to high risk buildings.
- 22 buildings with reportable amounts of hazardous materials. NDSU has a wide variety of hazardous chemicals under the reportable amounts.
- Airport with Air National Guard unit.
- One railroad borders this zone.
- Red River travels the length on the east side.
- Number of incidents is substantial.
- Peripheral areas with potential delay in secondary and tertiary responses.

Risk Diminishing Factors

- Low number of manufacturing jobs.

PZ 4



	2011	2010	2009	2008	2007
Total Calls	577	545	497	512	419
Rescue/Ems	199	220	212	217	202
Non Structure fires	29	27	23	39	17
Structure Fires	13	7	8	8	6
Other	305	265	254	256	200
Rescue	7	0	5	4	1
Hazmat	24	26	21	30	19

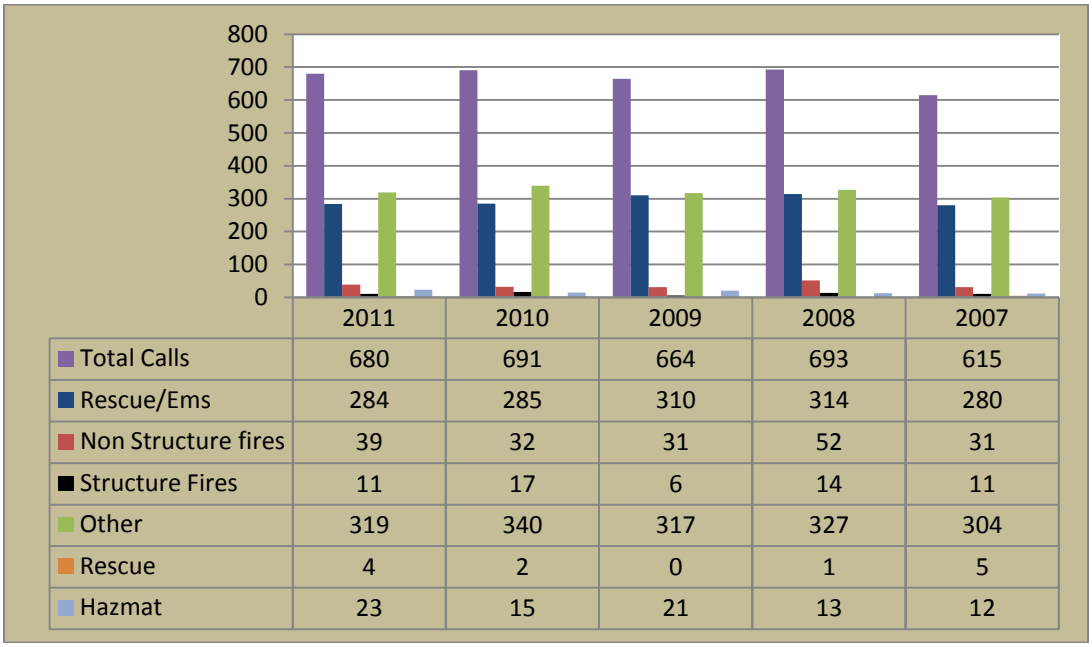
Risks Factors

- 2005 population density of 2,593 people per square mile.
- 330 high risk buildings.
- 2,111 single family houses.
- Three buildings four- six stories in height.
- Low ratio of sprinklered buildings to high risk buildings.
- 93 buildings with reportable amounts of hazardous materials.
- Two railroads pass through the zone with one switching yard.
- Highest number of manufacturing jobs.
- Substantial number of incidents.

Risk Diminishing Factors

- No peripheral areas with significant expectations of delay in secondary and tertiary responses.

PZ 5



	2011	2010	2009	2008	2007
Total Calls	680	691	664	693	615
Rescue/Ems	284	285	310	314	280
Non Structure fires	39	32	31	52	31
Structure Fires	11	17	6	14	11
Other	319	340	317	327	304
Rescue	4	2	0	1	5
Hazmat	23	15	21	13	12

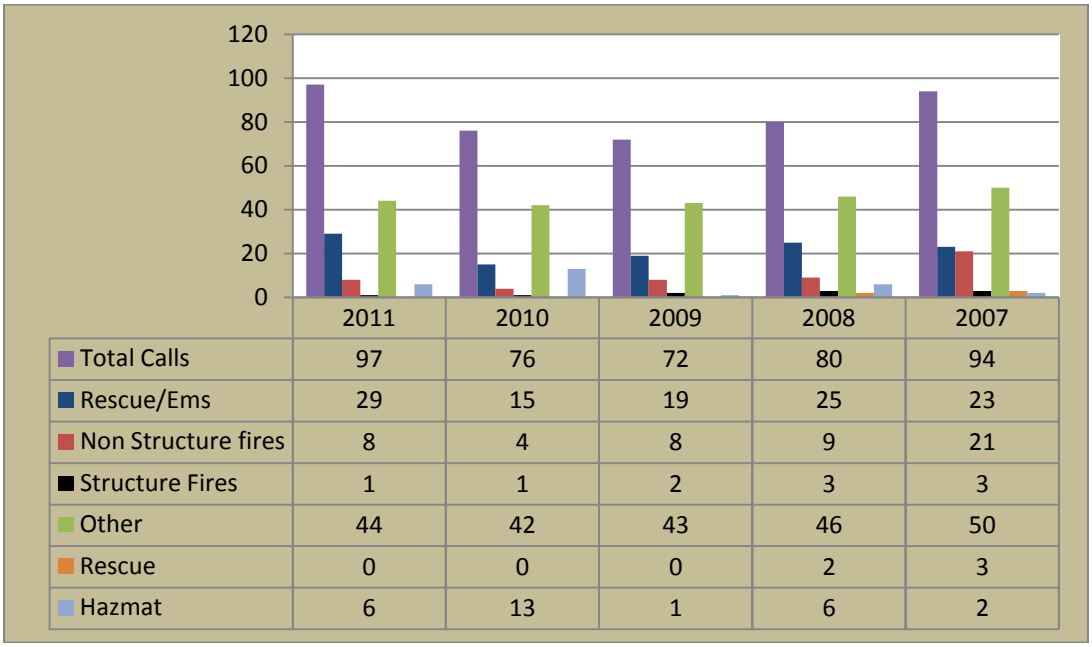
Risk Factors

- 2005 population density of 4,320 people per square mile.
- 414 high risk buildings, highest number of any planning zone.
- Two buildings seven or more stories in height.
- Four buildings four- six stories in height.
- 783 single family houses.
- Low ratio of sprinklered buildings to high risk buildings.
- 31 buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- One railroad passes through the zone.
- I-29 and I-94 both pass through this zone.
- Third highest number of incidents.

Risk Diminishing Factors

- Limited peripheral areas with significant expectations of delay in secondary and tertiary responses.

PZ 6



	2011	2010	2009	2008	2007
Total Calls	97	76	72	80	94
Rescue/Ems	29	15	19	25	23
Non Structure fires	8	4	8	9	21
Structure Fires	1	1	2	3	3
Other	44	42	43	46	50
Rescue	0	0	0	2	3
Hazmat	6	13	1	6	2

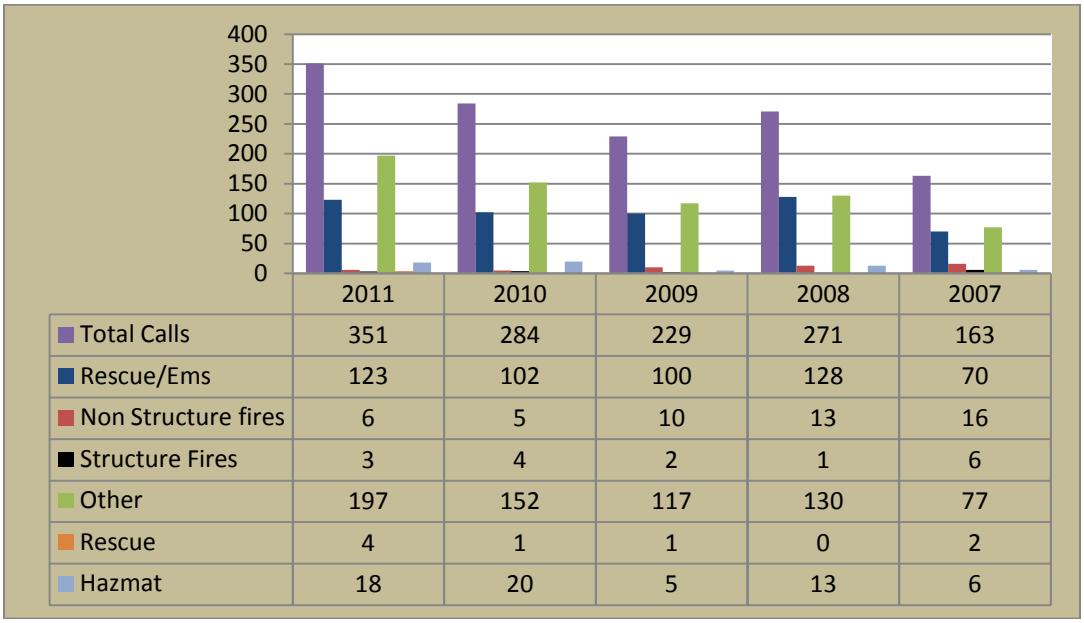
Risk Factors

- 137 high risk buildings many of significant size.
- Four buildings Four- Six stories in height.
- Low ratio of sprinklered to high risk buildings.
- 74 buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- One railroad passes through the zone.
- I-29 passes through this zone.
- High number of manufacturing jobs.

Risk Diminishing Factors

- 2005 population density that is negligible.
- Low overall demand for service.
- Six single family houses.
- Low population base decreases demand for medical assists.
- Below average number of high risk buildings.

PZ 7



	2011	2010	2009	2008	2007
Total Calls	351	284	229	271	163
Rescue/Ems	123	102	100	128	70
Non Structure fires	6	5	10	13	16
Structure Fires	3	4	2	1	6
Other	197	152	117	130	77
Rescue	4	1	1	0	2
Hazmat	18	20	5	13	6

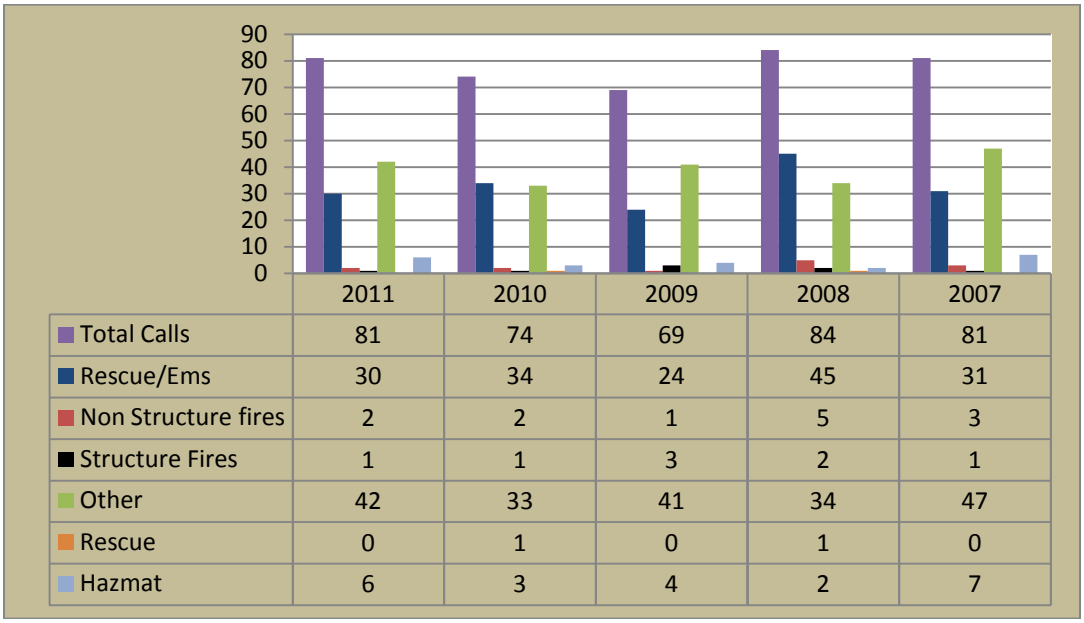
Risk Factors

- Potential for delay in primary response.
- Peripheral areas with potential delay in secondary and tertiary responses.
- 174 high risk buildings.
- 2,196 single family houses.
- Three buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- I-29 and I-94 border the zone.
- Small area with no hydrants.
- Third highest number of manufacturing jobs.
- Growing number of incidents.

Risk Diminishing Factors

- 2005 population density of 529 people per square mile.
- Very low number of building with reportable amounts of hazardous materials.
- Below average demand for service.
- Comparatively higher ratio of sprinklered buildings.
- Predominately newer construction.

PZ 8



	2011	2010	2009	2008	2007
Total Calls	81	74	69	84	81
Rescue/Ems	30	34	24	45	31
Non Structure fires	2	2	1	5	3
Structure Fires	1	1	3	2	1
Other	42	33	41	34	47
Rescue	0	1	0	1	0
Hazmat	6	3	4	2	7

Risk Factors

- Potential for delay in primary response.
- Peripheral areas with potential delay in secondary and tertiary responses.
- 12 high risk buildings.
- 1,929 single family houses.
- Red River travels the length on the east side.
- Four buildings with reportable amounts of hazardous materials.
- I-29 borders this zone.

Risk Diminishing Factors

- 2005 population density of 730 people per square mile.
- Low number of high risk buildings.
- Comparatively higher ratio of sprinklered to high risk buildings.
- Predominately newer construction.
- Very low number of building with reportable amounts of hazardous materials.
- Low number of manufacturing jobs.
- Low demand for service.

Development and Growth within the Planning Zones

The City of Fargo's 2007 growth plan addresses the future development of the City. One item the plan focuses on that has a positive impact on providing fire protection is reducing urban sprawl which results from leapfrog development. Urban sprawl is described as a disorderly pattern of development on the fringes of an urban area. Urban sprawl results in an uneconomical pattern of extended urban services (Heamavihio, 2007). Reducing this type of development would allow for a more efficient fire protection system.

While the growth plan contains plotted areas to the north of the City, the majority of the growth is to the south and west of the City. On the north side of the City, several factors deter growth such as the airport and sewage lagoons. The City is limited in growth to the west due to the City of West Fargo and on the east because of the Red River and state of Minnesota. During the 1980's and early 1990's, the majority of southerly growth occurred between the Red River and I-29. During the spring flood of 1997, river and overland flooding made this area vulnerable. Since that time, the City has been encouraging development west of I-29. An examination of building permits shows the majority of construction has been west of I-29 and a lesser amount of construction on the east of I-29. The City of Fargo continues to solicit funding to construct permanent flood protection to protect the south end of the City.

The issuance of building permits for new construction is an accurate method of measuring growth within the City and is particularly useful when planning for the fire protection in developing planning zones. In the City of Fargo, 2,512 building permits for new construction have been issued since 2004. PZ 7 contained the majority of the building permits issued at 1,864 or 74 % of the total. PZ 8 contained 425 issued permits, or 17 % of the total. PZ 7 and PZ 8 combined amounted to 2,289, or 91 % of the building permits issued from 2004 to 2010. This is illustrated by the chart in figure 20. An increase in development will relate to an increase in the demand for service within the developing planning zones.

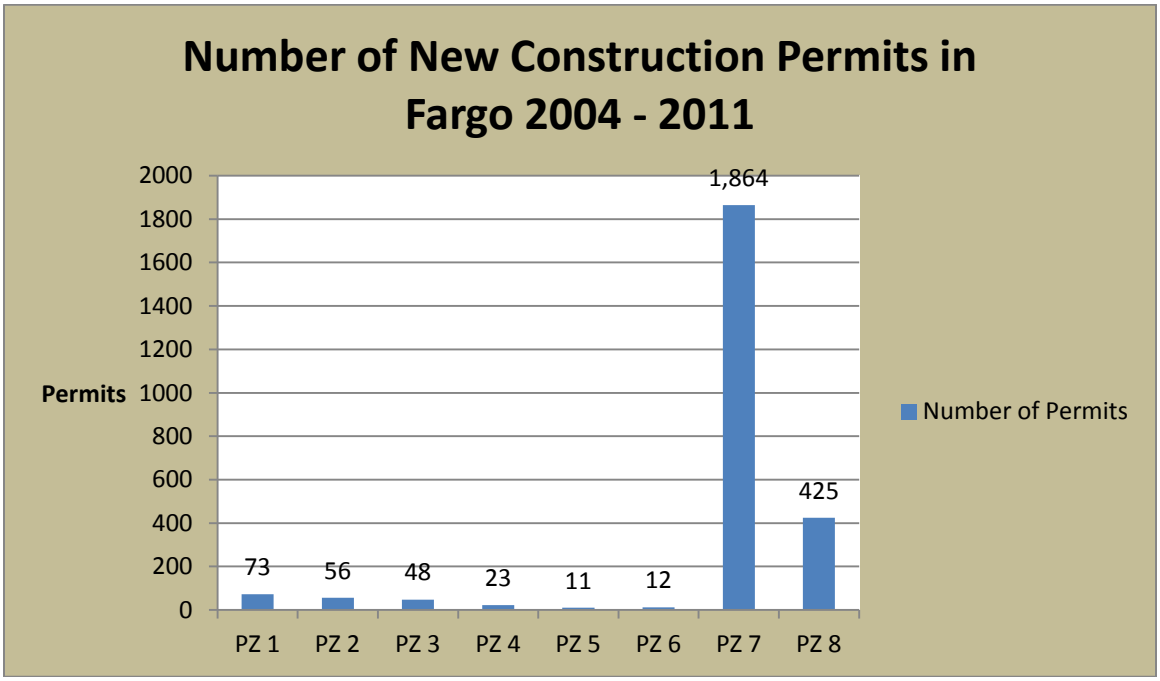


Figure 20. Building Permits 2004-2011

It is anticipated that the number of building permits for new construction will continue to be sizeable for PZ 7 and PZ 8, which in turn will correlate to an increased demand for service in those areas. A new senior high school is under construction in PZ 8, and development around this new facility is expected to increase. The Fargo Fire Department will continue monitor the development in PZ 8 and will recommend changes to the fire protection system as necessary.

Coverage of Fire Stations

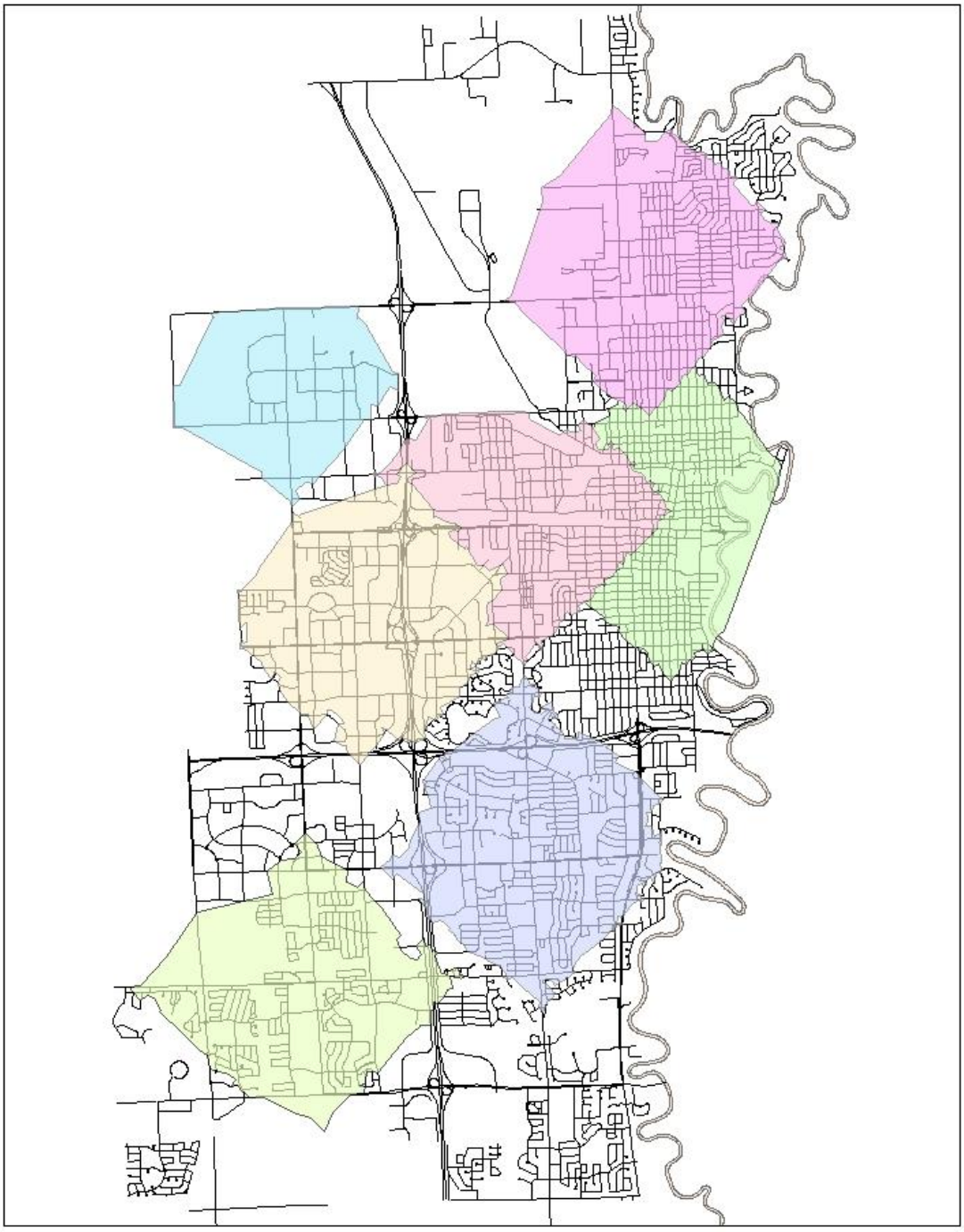
The total number of high risk buildings in each response zone of the City reflects the overall level of risk in each planning zone but this does not demonstrate where any weaknesses are in the fire protection system. One means of evaluating the levels of protection in the City of Fargo is to use the Insurance Services Office (ISO) standard of 1.5 mile travel distance for engines companies and 2.5 mile travel distances for ladder companies.

The ISO recommends a travel distance of 1.5 miles from a fire station for engine response. This 1.5 mile travel distance provides a good means of determining efficient station location and has become the benchmark for fire protection systems. In addition to this, ISO uses a formula that considers the number of hydrants within 1.5 miles of the current fire stations to determine the need for additional fire stations. The FFD uses the 1.5 mile response areas as a planning guide, but believes the ISO's emphasis on hydrants does not accurately address risks.

In Figure 21, the shaded areas are within the 1.5 mile response capabilities of the seven current engine companies. The orange dots are high risk buildings. From this map, areas of concern can be identified and analyzed more thoroughly. Obvious areas to consider are the neighborhoods between Station 1 and Station 2 primary response zones, and the south and southwest section of the City. A less obvious concern is the NDSU area. NDSU is in Engine 803's primary response zone but half of the campus is outside the 1.5 mile travel distance. The risk in this area was described above.

The area between Station 1 and Station 2 along South University Drive is also outside the 1.5 mile response zone of any engine. This area has a large percentage of single family homes, but also has a significant number of small commercial properties, four schools, two churches, and a nursing home.

Figure 21. High Risk Buildings within 1.5 Miles of the Seven Current Fire Stations



The southwest section of the city is covered by Station 7. There are a considerable number of high risk buildings between Station 7 and Station 5 response zones that are outside the 1.5 mile travel distance. Figure 22 is a map showing these high risk buildings that will not be covered. The area in question, between Station 5 and Station 7, has 112 high risk buildings but only 369 single family dwellings. The map also indicates a considerable amount of duplication in response area between Station 4 and Station 5. It is apparent that Station 5 was built too close to Station 4 for best coverage. When determining a location for Station 7, this overlap in coverage was taken into consideration. The FFD believes that relocating Stations 1 and 5 would help to mitigate the risk in both of these areas. More detailed recommendations for relocating these two stations are discussed in the Strategic Plan.

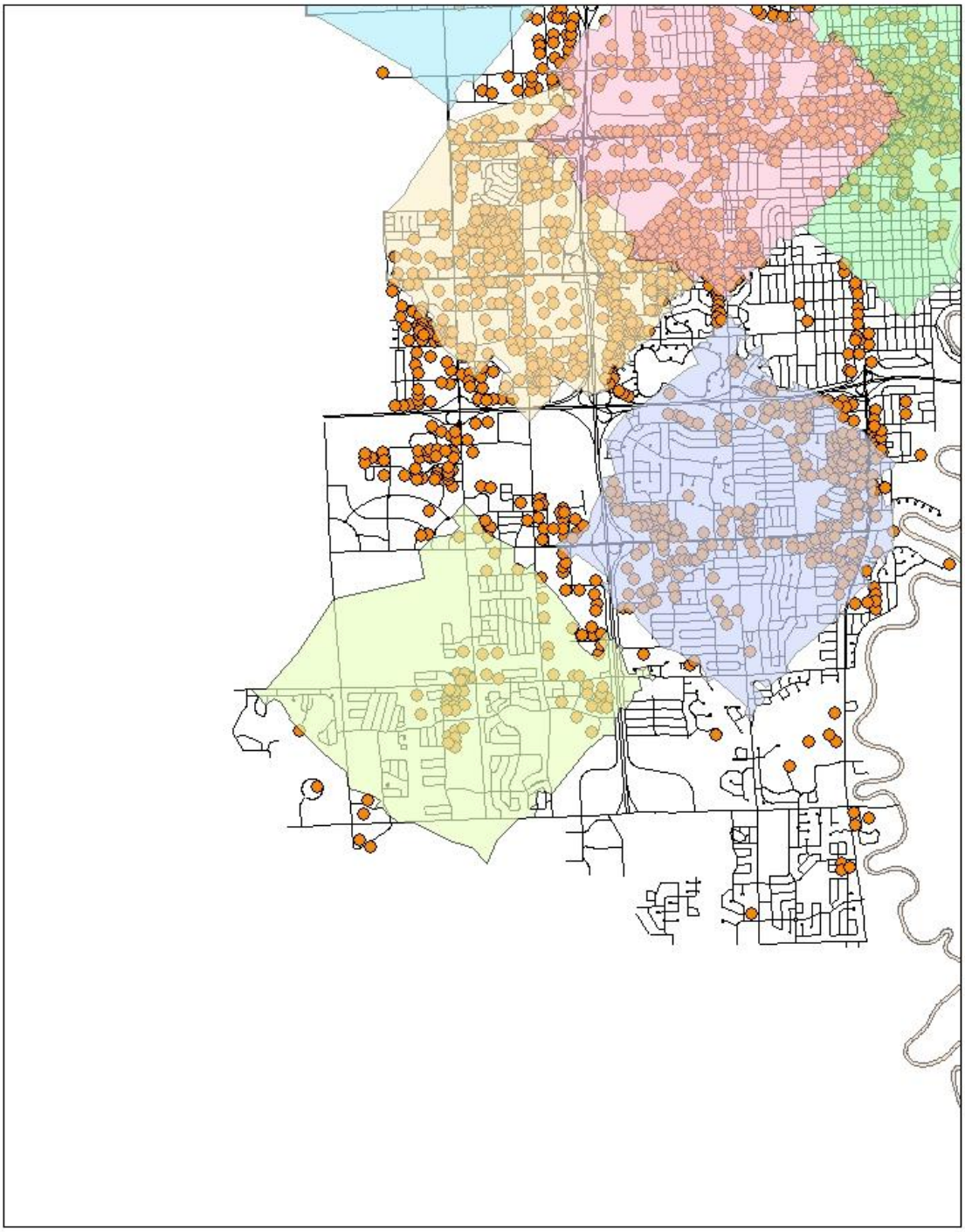
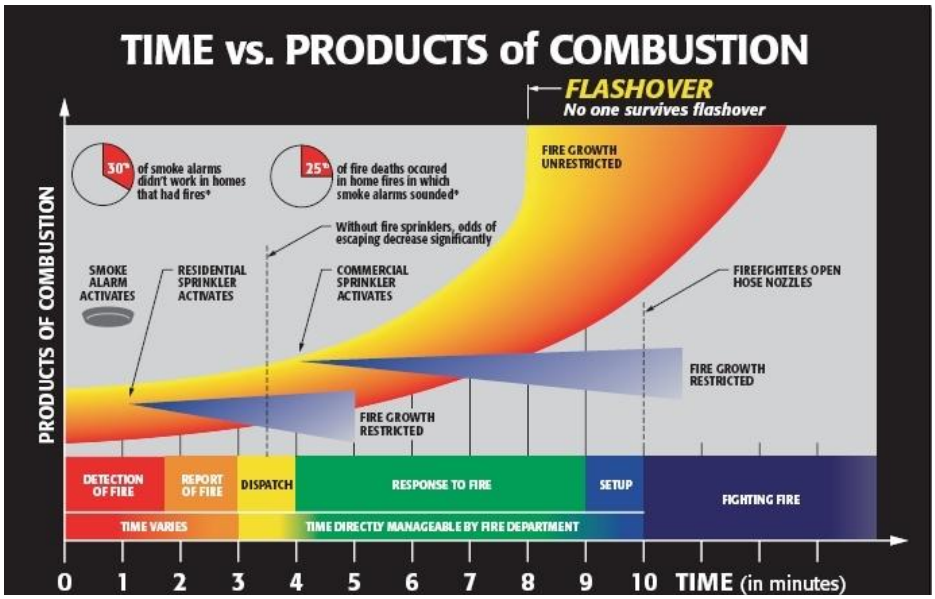


Figure 22. High Risk Buildings in Gap Between Station 5 and Station 7

Methodology of Response

The goal of the FFD is to, when possible; quickly and effectively control all fires in the room of origin. Structure fires can usually be contained in the room or area of origin if they can be extinguished in the pre-flashover stage. While the FFD must be prepared to deal with fires that progress beyond the room of origin, the FFD emphasizes its training and resources on aggressively attacking fires in their room or area of origin. Figure 23 below is the time/temperature curve for a typical structure fire; it shows a flashover time in as little as eight minutes.



http://www.firesprinklerassoc.org/High_Rise/FlashoverChart.pdf

Figure 23. Time vs. Products of Combustion

For this reason, the FFD desires to be on the scene of the fire in five minutes and 12 seconds or less travel time. Fires that cannot be extinguished in the room or area of origin often result in loss of the entire structure.

EMS calls make up the bulk of the low risk calls for service. The FFD does not consider all medical assist calls to be a primary mission. However, it does consider a timely response to cardiac and respiratory emergencies of importance. As indicated previously, changes in dispatching protocols reduced the amount of non-life threatening medical assist calls but life threatening emergencies are considered a priority. Cardiac emergencies are one type of life threatening emergency where time is important. Because the brain typically cannot sustain itself without oxygen for periods exceeding six minutes, a quick response by trained personnel can mean an increase in heart attack victim survivability. For this reason the FFD also desires to be on the scene of medical emergencies in five minutes and 12 seconds or less travel time.

Given this goal and the importance of a rapid response, it becomes necessary to determine the amount of resources needed to control emergencies during initial stages.

Critical Tasks and Effective Response Force

In order to establish an effective response force (ERF), the specific tasks necessary to mitigate a given situation are examined. Once these tasks have been identified, the number of personnel and apparatus needed to complete these tasks are determined. The FFD considers the following the tasks and minimum number of personnel needed to effectively mitigate various emergencies. The emergency situations defined include:

- EMS, low and moderate risk vehicle crashes.
- Low, moderate, and high risk category fires.
- Hazardous material incidents.
- Water/Ice rescue.
- Structural Collapse.
- Confined space, high angle and trench rescue.

EMS

Task	Firefighters
Record Keeping/Patient Care	1(Company Officer or Firefighter)
Patient Care	1(Firefighter)
ERF	2

This represents a single vehicle response with a minimum of two firefighters. Most EMS responses involve an engine company with a minimum of three personnel. However, there are occasions when the aerial, Special Operations Truck or suburban respond to EMS calls with two firefighters.

Vehicle Crashes

Low Risk

Task	Firefighters
Incident Command	1(Company Officer)
Vehicle Stabilization/Patient Care	2(Firefighters)
Extrication	2(Company Officer and Firefighter)
ERF	5

This response represents an engine company staffed with three and the Special Operations Truck staffed with two.

Moderate Risk

Task	Firefighters
Incident Command	1(Company Officer)
Safety Officer	1(Company Officer)
Extrication/Pump Operator	3(Firefighters/Engine Driver)
Vehicle Stabilization/Patient Care	3(Firefighters)
ERF	8

This response represents two engine companies staffed with three each and the Special Operations Truck staffed with two.

Fires

Low Risk

Task	Firefighters
Incident Command	1(Company Officer)
Pump Operator	1(Engine Driver)
Extinguishment	1-2(Firefighter, Company Officer)
ERF	3

Moderate Risk

Task	Firefighters
Incident Command	1 (Assistant Chief)
Attack Line	2 (1st Engine)
Pump Operator	1 (1st Engine Driver)
Search and Rescue	2 (Rescue Truck)
Ventilation/Water Supply	2 (2nd Engine)
Back up Line (2nd attack line)	2 (3rd Engine)
RIT/Utility Control	2 (Drivers 2nd & 3rd Engines)
ERF	12

These 12 people represent the minimum number of staff that would respond to a moderate risk structure fire within the City of Fargo. This correlates to a response of three engines staffed with three, one rescue staffed with two and one assistant chief.

High Risk

Task	Firefighters
Incident Command	1 (Assistant Chief)
Attack Line	2 (1st Engine)
Pump Operator	1 (1st Engine Driver)
Search and Rescue	2 (Rescue Truck)
Ventilation/Water Supply	2 (2nd Engine)
Back up Line (2nd attack line)	2 (3rd Engine)
RIT/Utility Control	2 (Drivers 2nd & 3rd Engines)
Aerial Truck Operations	2 (Aerial Truck)
ERF	14

These 14 people represent the minimum number of staff that would respond to a high risk structure fire. The response is the same as a moderate risk dispatch with the addition of the aerial.

The FFD considers the highest fire risk potential to be high rise structures. Fires in this type of structure would rapidly deplete the initial response resources. In order to fulfill the equipment and personnel requirements needed for a fire in this type of structure; multiple alarms will need to be called. As indicated in SOG 3-4-9 the FFD has four levels of alarms beyond the first alarm assignment that are:

- Second Alarm
    - Fourth engine from Fargo, engine company from Moorhead, command staff which includes the Chief, Safety Officer, Public Information Officer (PIO), and two off duty Assistant Chiefs.
- Third Alarm
    - First and second alarm assignment plus the remaining uncommitted apparatus from Fargo and a call back of the oncoming shift.
- Fourth Alarm
    - First, second, and third alarm assignments plus all remaining shift and eight hour personnel.
- Fifth Alarm
    - First, second, third, and fourth alarm assignments plus the West Fargo Fire Department and the Air National Guard structural truck.

As indicated in the high rise SOG 3-4-4, if there is confirmation of a fire in a high rise structure the assistant chief in charge can call for these additional alarms at any time or as early as at the initial dispatch. The SOG also indicates that a minimum of a third alarm will be called. With the confirmation of a fire and the activation of a third alarm, the response force would amount to nine apparatus and a minimum of 26 on-duty personnel. There would also be up to 35 off-duty personnel responding. It is important that if necessary, additional alarms are called early in the incident.

As stated previously, the FFD considers one story commercial properties less than 6500 sq. feet to be moderate risk and those above 6500 sq. feet to be high risk. Currently, the Red River Regional Dispatch Center (RRRDC) does not have the capabilities to dispatch based on these requirements. Present dispatching is based on occupancy types, residential, apartments, or commercial. Therefore, under the current dispatching method all fire related calls involving commercial properties are dispatched as high risk. In early 2011, a new CADRMS system is being implemented. While preparing to implement this system, the department will determine the feasibility of dispatching based on the criterion for high risk occupancies established in this document.

Hazardous Materials

The Fargo Fire Department works in conjunction with Moorhead Fire and Rescue as the Northwest Minnesota Regional Hazardous Materials team. This team provides hazardous materials response capabilities to Fargo, Moorhead, Cass County in North Dakota, and the Northwest region of Minnesota. Team members are trained to technician level and several to specialist level. The team is able to identify unknown chemicals as well as analyze the effects of chemical leaks, spills, and releases. In addition to hazardous materials response team members, all fire suppression personnel are trained to the hazardous materials operations level.

Engine 806 and 846 (Hazardous Materials Response vehicle and trailer) are cross staffed and are dispatched initially for hazardous materials incidents, but mutual aid resources are not dispatched until requested. The command vehicle, the two nearest engines, and one rescue truck are dispatched in addition to 806 and 846. In high risk buildings, the aerial is also dispatched. Though 846 is initially dispatched, it does not necessarily respond to every run. In all hazmat

incidents, the assistant chief has the discretion as to whether or not 846 should respond to the emergency scene. Hazmat 846 is a cumbersome vehicle and limiting the responses reduces the wear and tear on the vehicle and reduces the risk of crashes. An example of an incident where the assistant chief might not have 846 respond would be a response to natural gas lines hit during construction. The department relies on Xcel Energy to mitigate most of these types of incidents and 846 is seldom needed.

Because 806 and 846 are located in the northwest corner of the City and are always dispatched on hazmat incidents, the response time for a first alarm assignment is longer. The following is the list of tasks and personnel needed to secure the scene at a hazmat incident and are capable of mitigating small incidents.

Hazardous Materials & Natural Gas Leak - High Risk

Task	Firefighters
Incident Commander	1
Hazmat Team leader	1
Recon	2
Air Monitoring	4
Zone Exclusion	4
Science Officer	1
Emergency Decon	1
ERF	14

Hazardous Material & Natural Gas Leak - Moderate Risk

Task	Firefighters
Incident Commander	1
Hazmat Team leader	1
Recon	2
Air Monitoring	4
Zone Exclusion	2
Science Officer	1
Emergency Decon	1
ERF	12

Fuel Leak less than five Gallons

Task	Firefighters
Incident Commander	1
Spill Containment	2
ERF	3

Confirmed small-leaks are handled by one engine.

Water/Ice Rescue

For water and ice rescue, the initial minimum response consists of three engines staffed with three firefighters each, one rescue staffed with two, and one assistant chief. Depending on the time of year, one of the three engines will bring with them either the rescue boat (zodiac) or ice rescue equipment. If the situation dictates, the incident commander can request additional boats

or ice rescue equipment and personnel. Also, with any incident involving the Red River, the Moorhead Fire Department is dispatched and responds with one boat.

The specific tasks performed by the rope handlers/riggers and support personnel vary depending on the situation. Water flow rates, location of the victim, rescue versus body recovery are examples of variables, which dictate specific tasks. More detailed explanations of specific tasks are outlined in SOG 3-6-7.

The FFD does not have a dive rescue team. A local organization called Valley Dive Rescue provides this service. The City of Fargo provides funding to this organization and has an agreement with them to provide service. They are part of the initial dispatch on calls involving water rescue. The FFD does have periodic training exercises with the Valley Dive Rescue team.

Water Rescue

Task	Firefighters
Incident Commander	1
Boat Operator/per boat	1
Boat Rescuer/per boat	1
Rope Handlers/Riggers	4
Support Personnel	5
ERF	12

Ice Rescue

Task	Firefighters
Incident Commander	1
Safety	1
Rescuer	1
Backup Rescuer	1
Rope Handler / Riggers	4
Support Personnel	4
ERF	12

Structural Collapse

The minimum initial response force for structural collapse consists of three engines staffed with three personnel, one rescue staffed with two personnel, one aerial staffed with two personnel, and one assistant chief. Since Station 4 is staffed with personnel trained in rescue operations as well as the necessary specialized equipment, Engine 804 must be one of the engines dispatched. They would bring with them the truck and trailer carrying this equipment. An incident of any magnitude would require a significant amount of additional personnel. With confirmation of a structural collapse, the incident commander can activate the code red system and call back all special rescue trained personnel. SOG 3-6-3 provides a detailed outline of structural collapse procedures. The FFD has defined our level of response for major incidents to the first four hours of the incident based on available mutual aid resources having a three to four hour response time. Sioux Falls, SD Fire Department and the Bismarck Fire Department are the primary mutual aid resources for the FFD in structural collapse incidents.

Structural Collapse

Task	Firefighters
Incident Commander	1
Safety	1
Building Triage	2
Shoring Officer	1
Shoring Team	4
Rescuers	2
Backup Rescuers	2
Air Monitoring	1
ERF	14

Confined Space, Trench, High Angle

Confined space, trench, and high angle rescue has a minimum effective response force of three engines staffed with three, one rescue staffed with two, and one assistant chief. As was stated earlier with structural collapse, if the situation dictates the need for additional personnel and equipment, the incident commander will call for additional resources.

Confined Space

Task	Firefighters
Incident Commander	1
Safety Officer	1
Operations Officer	1
Rescuers	2
Backup Rescuers	2
Supplied Air Attendant	1
Riggers/Rope Handlers	3
Air Monitoring	1
ERF	12

Trench Rescue

Task	Firefighters
Incident Commander	1
Safety Officer	1
Operations Officer	1
Shoring Team	4
Rescuers/Diggers	4
Air Monitoring	1
ERF	12

High Angle

Task	Firefighters
Incident Commander	1
Safety Officer	1
Rescuers	2
Backup Rescuers	2
Rope Handlers/Riggers	6
ERF	12

Performance Objectives

With the critical tasks and effective response forces defined, performance objectives are established. These objectives outline the goal and desired response time to the various types of emergencies. Performance is measured in two ways; the first is based on the City and department as a whole and the second is by breaking it down by planning zones.

The response time objectives set for fire and EMS calls for the department as a whole, are established based on the apparatus travel time criteria for an urban population density outlined by the CFAI in the Fire& Emergency Service Self-Assessment Manual. This travel time, combined with the call processing and turnout time, make up the stated desired total response time. Though the response time objectives for fire and EMS are the same time, the times are arrived at by different means. This will be explained further in a detailed analysis of the three time elements found in the following section.

As mentioned earlier, PZ 6, PZ7 and PZ8 have population densities that could be classified as rural. Because of the large number of industrial buildings in PZ6 and the associated risks, the department has decided to consider the planning zone an urban area when analyzing individual planning zones. With the growth and increasing demand for service in PZ7, the department is choosing to classify this zone as suburban. PZ8 has less risk and less demand for service than PZ6 or PZ7. Therefore, the FFD has decided to use the rural classification for PZ8.

Table 10 represents the FFD's desired benchmark total response times objectives for the three population density categories. Because of deficiencies in call processing times, departmental response baselines are established using travel times only. These deficiencies are explained in detail in the following section.

Table 10. Total Response Time Benchmark and Baseline Objectives

	1st unit on scene		1st alarm on scene	
	Benchmark	Baseline	Benchmark	Baseline
Urban	7:00	8:12	11:00	13:24
Rural	12:00	16:00	16:00	21:12

With broad objectives defined, more specific objectives for each type of response are established. Later in this document, response times for each planning zone are measured based on their defined criteria. The City as a whole is considered urban and the following are

department wide performance objectives for various emergencies based on this criterion. The stated response time objectives for hazardous materials and technical rescue are different than for fire and EMS. The longer performance measures for hazmat incidents allows for dispatch to gather more information and the fact that crews sometimes need to gather items such as additional bags of absorbent material or bundles of absorbent pads. The response time objectives for technical rescue are based on the best judgment of the FFD administration.

Response to Low Risk

EMS

Goal: Provide basic life support (BLS) with defibrillation when arriving before ALS provider.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force EMS.**

Performance measure: Single unit response with a minimum of two people and shall arrive within 8 minutes and 12 seconds total response time 90% of the time when responding emergent.

One or two vehicle crashes with injuries

Goal: Provide patient extrication from motor vehicle crashes of up to two vehicles and to stop the deterioration of a patient's medical condition through BLS and defibrillation until arrival of ALS unit.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Vehicle Crashes.**

Performance measure: Each engine with a minimum of three personnel and the rescue truck with a minimum of two personnel. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes and 42 seconds total response time 90% of the time. Second unit shall arrive within 13 minutes and 54 seconds total response time 90% of the time.

Fire

Goal: Extinguish small fires without exposure problems to include - vehicle fires, grass fires, dumpster fires, and fires in small outbuildings and storage sheds.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Fires.**

Performance measure: Single engine with a minimum of three personnel and shall arrive within 8 minutes and 12seconds total response time 90% of the time when responding emergent.

Hazardous Material

Goal: To contain and recover petroleum and other non-life threatening products in quantities of five gallons or less.

Performance measure: Single engine with a minimum of three personnel. Unit shall arrive in 9 minutes 42 seconds total response 90% of the time when responding emergent.

Response to Moderate Risk

Fire

Goal: Contain the fire to room of origin and provide search and rescue.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Fires.**

Performance measure: Three engines staffed with a minimum of three personnel each, rescue truck staffed with a minimum of two personnel, assistant chief's vehicle staffed with one. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes 12 seconds total response time 90% of the time. Remaining apparatus shall arrive within 13 minutes and 24 seconds total response time 90% of the time.

Vehicle crashes on interstate or involving more than two vehicles

Goal: Provide patient extrication from motor vehicle crashes with more than two vehicles or on Interstate Highway; and to stop the deterioration of a patient's medical condition through BLS and defibrillation until arrival of ALS unit.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Fires.**

Performance measure: Two engine companies staffed with a minimum of three each, rescue truck with a minimum of two personnel. First arriving unit shall arrive within 8 minutes and 42 seconds total response time 90% of the time.

Hazardous Material

Goal: To minimize hazards to life and the environment.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Hazardous Materials & Natural Gas Leak**.
Performance measure: Three engines staffed with a minimum of three personnel each (one engine must be 806), hazardous material unit (846), rescue truck with a minimum of two

personnel each, one assistant chief. First unit shall be on scene within 9 minutes 42 seconds total response time 90% of the time. The second arriving unit shall be on scene within 14 minutes and 24 seconds 90% of the time. Remaining apparatus including 806 and 846 shall arrive within 20 minutes 90% of the time when responding emergent.

Response to High Risk

Fire

Goal: Contain the fire to room of origin and provide search and rescue.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Fires.**

Performance measure: Three engines staffed with a minimum of three each, rescue truck staffed with a minimum of two, one aerial truck staffed with a minimum of two, one assistant chief vehicle with a minimum of one. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes and 12 seconds total response time 90% of the time. Remaining apparatus shall arrive within 13 minutes and 24 seconds total response time 90% of the time when responding emergent.

Hazardous Material

Goal: To minimize hazards to life and the environment.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Hazardous Materials & Natural Gas Leak**.

Performance measure: Three engines staffed with a minimum of three personnel each (one engine being 806), Hazardous Material unit (846), rescue truck with a minimum of two personnel each, aerial staffed with a minimum of two, one assistant chief. First unit shall be on scene within 9 minutes 42 seconds total response time 90% of the time. The second arriving unit shall be on scene within 14 minutes and 24 seconds 90% of the time. Remaining apparatus including 806 and 846 shall arrive within 20 minutes 90% of the time when responding emergent.

Other Responses

Response to Water/Ice Rescue

Goal: To perform water/ice rescue or body recovery in a timely manner without compromising responder safety.
Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force for Water/ Ice Rescue**

Performance measure: Three engines staffed with a minimum of three personnel each, rescue truck with a minimum of two personnel, one assistant chief. First arriving unit shall be on scene within 10:30 minutes total response time 90% of the time. The total first alarm should be on scene within 15 minutes and 24 seconds total response time 90% of the time. This allows 2:30 for hooking up to the boat and slower drive speeds due to towing.

Response to Structural Collapse

Goal: Provide structural stabilization and rescue involving structures that fall into the moderate risk category. For structures beyond moderate risk; response is limited to structural stabilization and rescue for the first four hours of the incident.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Structural Collapse.**

Performance measure: First arriving unit shall arrive within 8 minutes 12 seconds total response time 90% of the time. Second arriving unit shall arrive within 13minutes and 24 seconds total response time 90% of the time. Remaining apparatus shall be on scene within 30 minutes total response time 90% of the time.

Response to Confined Space, High Angle, Trench Rescue

Goal: To perform confined space, high angle, and trench rescue in a timely manner without compromising responder safety.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force for Confined Space, Trench, High Angle.**

Performance measure: First arriving unit shall arrive within 8 minutes 12 seconds total response time 90% of the time. Second arriving unit shall arrive within 13minutes and 24 seconds total response time 90% of the time. Remaining apparatus shall be on scene within 30 minutes total response time 90% of the time.

Summary of Minimum Effective Response Forces

	Low Risk	Moderate Risk	High Risk	Other Responses	
EMS	2	N/A	N/A	Water/Ice Rescue	12
Vehicle Crashes	5	8	N/A	Structural Collapse	14
Fire	3	12	14	Con Space, High Angle, Trench	14
Hazmat	3	12	14		

Summary of Baseline and Benchmark Performance Measures

EMS	Baseline – 90%	Benchmark – 90%
Call Processing	2:00	1:30
Turnout Time	1:30	1:00
Travel Time	5:12	4:30
Total Response Time	8:12	7:00
Vehicle Accidents		
Call Processing	2:00	1:30
Turnout Time	1:30	1:00
Travel Time 1st App. on Scene	5:12	4:30
Total Response Time 1st App. on Scene	8:42	7:00
Travel Time 2nd App on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	13:54	10:30
Fire		
Call Processing	1:30	1:00
Turnout Time	1:30	1:00
Travel Time 1st App. on Scene	5:12	4:30
Total Response Time 1st App. on Scene	8:12	6:30
Travel Time 2nd App. on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	13:24	10:00
Travel Time 1st Alarm on Scene	10:24	9:00
Total Response Time 1st Alarm on Scene	13:24	11:00
Hazmat		
Call Processing	2:00	1:00
Turnout Time	2:00	1:30
Travel Time 1st App on Scene	5:12	4:30
Total Response Time 1st App. on Scene	9:42	7:00
Travel Time 2nd App. on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	14:24	10:30
Total Response Time 1st Alarm on Scene	20:00	18:00
Water Ice Rescue		
Call Processing	1:30	1:00
Turnout Time	2:30	2:00
Travel Time 1st App on Scene	6:30	6:00
Total Response Time 1st App. on Scene	10:30	9:00
Travel Time 2nd App. on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	14:24	11:00
Total Response Time 1st Alarm on Scene	15:24	14:00
Structural Collapse, Trench, Con Space, High Angle		
Call Processing	1:30	1:00
Turnout Time	1:30	1:00
Travel Time 1st App on Scene	5:12	4:30
Total Response Time 1st App. on Scene	8:12	6:30
Travel Time 2nd App. on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	13:24	10:00
Total Response Time 1st Alarm on Scene	30:00	25:00

Measurement of Response Time Performance

With the performance measures defined, it is important to determine whether or not the department is meeting these expectations. This is done by analyzing response time data. Prior to 2008, several data elements in relation to response times were not entered correctly into the RMS. This includes not differentiating between time of call and time of dispatch. Only the time of dispatch was entered into the RMS. Also, prior to 2008, the department had not defined planning zones and emergency responses into these areas were not recorded into the RMS. The FFD does not consider it beneficial to allocate the significant amount of personnel resources needed to correct the years prior to 2008. A department wide analysis was performed for 2006 through 2010 for the first apparatus on scene from dispatch to arrival. For 2008, 2009, and 2010 an analysis for travel time and total response time of the first and second apparatus on scene was conducted department wide and by planning zones.

To assist with calculating these measurements the computer software NIFRS5 Alive was used. This software takes data from the current RMS and performs the fractile calculations. The performance measures stated in the above Performance Objective section represents total response time. This time is an accumulation of three separate categories;

> Call processing time – Represents the time from which a 911 call is answered until the appropriate units are dispatched.
> Turn out time – Represents the time from which a fire unit receives the dispatch until it is enroute.
> Travel time – The time from which a fire unit goes enroute until it arrives on scene.

Call Processing
The CFAI recognizes NFPA Standard 1221 for call processing time, which is 60 seconds 90% of the time. An analysis of call processing times indicates that call processing times for 2008 were unacceptable. During 2009 and 2010 changes to call processing were implemented which resulted in some improvements. In 2011 the fire department worked with dispatch… A grant has been applied for in 2012 to purchase PRO QA, computerized medical dispatching software program which should result in better call processing times. Changes in dispatching protocols will continue to be refined.

The analysis of 2011 data identified 4,785 incident records. Abnormal records that did not accurately reflect dispatch performance were not considered. These include:

- Calls that the FFD was not initially dispatched, such as when the police or ambulance service were on scene and requested our service, were eliminated. This left 3,852 incident records.
- A number of recorded call processing times that were clearly invalid remained. In most of these cases the error identified was that the response was coded as initially dispatched when it should have been coded as not initially dispatched. Other less common Red River Regional Dispatch Center (RRRDC) errors were also identified.
- To eliminate those records that were least accurate, the standard deviation for call processing was calculated. The standard chosen as a conservative means to eliminate the

most errant records was to eliminate those dispatch times that were more than two standard deviations from the mean. Further review of 2009 data indicated that any dispatch time over eight minutes was more than two standard deviations greater than the mean. This left 3,817 records to be analyzed.

- Of the 3,780 runs, 37 were removed during calculation in the NFIRS 5 Alive program because of zero time values.

The call processing time from these 3,780 records had an average time of 1:41 compared to 2008's average of 2:45. One minute and 30 seconds is reached 55.0% of the time compared to 2008 percentage of 14.6%. Most of the changes at the RRRDC occurred in the last quarter of the year. In 2011 RRRDC began monitoring their call processing times, manually calculating their 90% fractile numbers, and investigating any call processing times over two minutes? For the 4th quarter, calls were dispatched in 1:30, 58.0% of the time. These numbers demonstrate improvement, but the FFD will continue to work with the RRRDC to bring the call processing times to acceptable levels.

Problem Identification:
A review of the call handling process and time stamping procedure at the RRRDC by the accreditation committee revealed four reasons. for these below standard call handling times:

- Inefficient call handling procedures
- Staffing
- Law Enforcement focused culture where speed is less important
- Technical limitations.

Resolution of inefficient call handling procedures
The RRRDC is a multi jurisdictional dispatch center, dispatching all public safety agencies in Cass County, North Dakota and Clay County, Minnesota. Dispatchers are required to follow numerous dispatching protocols; these protocols are being simplified to facilitate more timely dispatch. An assistant chief is meeting regularly with the RRRDC to correct the call handling issues as they relate to the department. The FFD will continue to monitor and make recommendations to improve this process. Also, beginning January 12th 2010, the FFD implemented pre-alerting as a means to improve call processing (delete?).

Resolution of technical limitations
The FFD has limited confidence that 60 seconds can be achieved prior to the implementation of the new computer aided dispatch system. Early in 2011, a new Computer Aided Dispatch, Record Management System (CAD/RMS) was implemented, having a positive impact on the technical limitations.

Another factor that delays call processing times is the use of priority dispatching protocols for EMS calls. Since the FFD is a secondary responder to all EMS calls, all EMS calls are screened to determine if an FFD response is needed. The series of questions that are asked delay dispatch, but eliminate an estimated 50% of medical runs where a fire crew would not positively impact the incident.

Even with the excessively long call processing time, the FFD has used 90 seconds for fire and two minutes for EMS calls when determining the baseline for the total response time. At this point, a call processing time of 60 second 90% for fires and 90 seconds for EMS calls are the department's benchmark.

Turnout Time

The FFD uses a turnout time of 90 seconds 90% of the time as a baseline for fire and EMS calls and 60 seconds 90% of the time as a benchmark. Excluding hazmat and water rescue calls which have baseline turnout times of 2:00 and 2:30 respectively, there were 4,305 incidents in 2010. Of the 4,785 incidents in 2011, 390 were ignored by NFIRS5 Alive because of a zero time value. These zero time values are predominantly the result of units being canceled before going enroute. The computed results from the remaining 4,395 records showed that the FFD's current fractile performance at 60 seconds is 60.6% of the time and 90 seconds is 92.5% of the time. The FFD has always emphasized the importance of a prompt turn out however, prior to the accreditation process there had never been a stated goal. Now that the FFD has defined an expected level of service turn out times have continuously improved to the current level above the baseline standard. Fargo Fire will continue monitoring turnout times in the future by station and shift. There was a slight decrease in turnout times from 2010 to 2011. Much of this can be attributed to the new software system which has presented many system problems, making turnout times appear longer than they actually were.

Travel Time

In the FFD, not all apparatus respond to all calls with lights and sirens. For example, if a call comes in for alarms going off in an apartment building, but there is no report of smoke or fire, then only the primary engine responds emergent (lights and siren); the remaining responding apparatus respond non-emergent (no lights or siren). If the primary engine arrives and has an indication that this may be more than just alarms going off, then the remaining responding apparatus are upgraded to emergent. Other examples of the types of calls where the FFD responds non emergent include carbon monoxide detector activations, lift assists, police assists, outdoor odor investigations, citizen complaints, and alarm resets. Because of the wide variety of calls to which the FFD responds, there are incidents where it is up to the discretion of the officer in charge whether or not to respond emergent. In the current RMS there is a data element which records the response code for each apparatus on every call and the FFD began entering this data in 2008. For the purpose of tracking travel time, only apparatus with a response code of 1, which is emergency response, were analyzed.

Based on the community description outlined in the CFAI self assessment manual, the City of Fargo collectively falls into the urban category which is defined as a city over 30,000 people and or a population density over 2,000 people per square mile. Within this category the CFAI requires a minimum base line travel time of 5:12 90% of the time for the first arriving unit; 10:24 90% of the time for the second arriving unit.

The following chart is the current department wide fractile performance for travel time. This data represents all types of responses and represents apparatus that responded emergent and arrived on scene.

Travel Time Department Wide

Baseline – 5:12 90% Benchmark – 4:30 90%				
Travel Time	**Records**	**4:30**	**5:00**	**5:12**
1ST Apparatus on Scene 2008	3,196	81.6%	86.8%	88.1%
2008 excluding PZ7 and PZ8	2,934	86.5%	91.4%	92.4%
1st Apparatus on Scene 2009	2,841	79.1%	84.9%	86.6%
2009 excluding PZ7 and PZ8	2,625	84.4%	90.0%	91.5%
1st Apparatus on Scene 2010	2,535	81.1%	87.8%	89.5%
2010 excluding PZ8 (Station 7 Open)	2,501	81.7%	88.3%	90.1%
1st Apparatus on Scene 2011	2,800	83.5%	89.0%	90.9%
2011 excluding PZ8	2,755	84.5%	89.8%	91.7%
Baseline – 10:24 90% Benchmark – 8:00 90%				
Travel Time	**Records**	**8:00**	**10:00**	**10:24**
2nd Apparatus on Scene 2008	777	96.1%	98.8%	99.0%
2009	769	96.6%	99.3%	99.7%
2010	778	96.3%	99.1%	99.6%
2011	788	95.6%	98.6%	98.8%

The travel time percentages in 2009 for first apparatus on scene are lower than the 2008, but most of the decrease is accounted for in the first quarter of the year when above average snow and record flooding hampered travel times. The other three quarters had numbers close to those of 2008. When PZ 7 and PZ8, which are not classified as Urban and are excluded the department meets the Baseline Performance

Dispatch to Arrival Time

In the FFD's 2009 SOC, to make comparisons for more than three years the department used dispatch to arrival times. In 2006 and 2007, the department did not record the time of call, only the time of dispatch. Given this limitation, the best assessment of performance for the response times in 2006 and 2007 is dispatch to arrival time, department wide. Because changes in the response code field in the *Firehouse* RMS make differentiation between emergent and non-emergent incidents unreliable in 2006 and 2007, the times included all runs in the department, both emergent and non-emergent. Incidents where units were canceled before arrival were excluded. To verify consistency within the FFD, dispatch to arrival times for all runs and for emergent runs for 2008, 2009, and 2010 are included.

2006-2011 Dispatch to Arrival - Department Wide

2006 (3,609 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	3,374	76.9%	82.9%	87.1%
2007 (3,884 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	3,661	79.1%	84.2%	88.2%
2008 (4,280 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	4,059	75.2%	82.9%	86.7%
2008 Emergent Only				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	3,196	79.8%	85.7%	89.6%
2009 (4,209 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	3,931	72.4%	78.5%	83.5%
2009 Emergent Only				
Dispatch to Arrival	Records	5:30	6:00	6:30
1ST Apparatus on Scene	2,841	78.3%	83.6%	88.0%
2010 (4477 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1st Apparatus on scene	4189	77.3%	83.3%	87.5%
2010 Emergent Only				
Dispatch to Arrival	Records	5:30	6:00	6:30
1st Apparatus on scene	2535	84.9%	89.9%	93.1%
2011 (4785 total records)				
Dispatch to Arrival	Records	5:30	6:00	6:30
1st Apparatus on scene	4511	76.7%	83.2%	87.5%
2011 Emergent Only				
Dispatch to Arrival	Records	5:30	6:00	6:30
1st Apparatus on scene	2801	83.9%	89.1%	92.6%

Total Response Time

When measuring performance against established performance indicators, the following baseline measurement of the department and each planning zone were calculated. The tables below indicate the 15 second increments immediately before and after the performance indicator through 2009 when the program used to run time calculations only calculated in 15 second increments.

The following is the current baseline performance for total response time department wide, including PZ 8. Because Hazmat has a different performance indicator, the number of records analyzed does not include hazardous material responses and represent apparatus that responded emergent and arrived on scene. Records with a zero time value and those with a call processing of greater than eight minutes were also removed. The department wide measurements include all incidents where units went emergent and therefore contains many runs not categorized in the more specific measurement groups, such as EMS or Structure Fires. This larger sampling allows for a more confident analysis. The baseline and benchmark measure are based on the performance measures for structure fires.

Total Response Time - Department Wide

Benchmark 6:30 90%		Baseline 8:12 90%			
Total Response Time		**Records**	**6:30**	**8:00**	**8:15**
1ST Apparatus on Scene	2008	3,046	45.8%	72.4%	75.5%
	2009	2,714	52.5%	77.0%	80.3%
					8:12
	2010	2,524	69.7%	89.2%	90.8%
	2011	2,664	66.5%	87.1%	88.6%
Benchmark 10:00 90%		**Baseline 13:24 90%**			
Total Response Time		**Records**	**10:00**		**13:15**
2nd Apparatus on Scene	2008	765	82.0%		97.0%
	2009	758	86.8%		97.9%
					13:24
	2010	760	93.7%		98.5%
	2011	798	92.7%		98.4%
Benchmark 11:00 90%		**Baseline 13:24 90%**			
Total Response Time		**Records**	**11:00**		**13:15**
1ST Alarm on Scene	2008	184	45.7%		72.8%
	2009	153	51.0%		77.8%
					13:24
	2010	177	69.1%		88.3%
	2011	190	71.9%		88.1%

Response Time Performance for Emergency Medical

For 2008, 2009, 2010, and 2011 there were 1,876 / 1,671 / 1,712 / 1,746 EMS records respectively. Records where the apparatus did not arrive and those with a call processing of greater than eight minutes were removed, leaving 1,645 / 1,354 / 1,576 and 1,593 records to be analyzed. PZ7 & PZ8 were removed for travel and total response time calculations.

Call Processing and Turnout for EMS

Benchmark 1:30 90%		Baseline 2:00 90%	
Call Processing	**Records**	**1:30**	**2:00**
2008	1876	8.5%	21.4%
2009	1671	16.8%	31.3%
2010	1712	24.5%	42.7%
2011	1746	23.4%	36.2%
Benchmark 1:00 90%		**Baseline 1:30 90%**	
Turnout Time	**Records**	**1:00**	**1:30**
2008	1876	61.3%	86.3%
2009	1671	65.0%	89.4%
2010	1712	74.4%	95.9%
2011	1746	68.5%	94.3%

EMS Travel Time 1st Apparatus on scene excluding PZ7 & PZ8

Benchmark 4:30 90% Baseline 5:12 90%			
Year	**Records**	**4:30 Travel Time**	**5:00 Travel Time**
2008	1501	86.4%	91.7%
2009	1235	85.3%	90.3%
2010	952	82.1%	88.2%
2011	1027	85.2%	91.1%

EMS Total Response Time 1st Apparatus on scene excluding PZ7 & PZ8

Benchmark 7:00 90% Baseline 8:12 90%			
Year	**Records**	**7:00 Response Time**	**8:15 Response Time**
2008	1501	57.9%	78.2%
2009	1235	63.1%	82.3%
2010	952	71.5%	88.3%
2011	1027	65.8%	84.8%

Response Time Performance for One or Two Vehicle Crashes

For 2008, 2009, and 2010 there were 196, 177, and 159 one or two vehicle crashes incident records respectively. For 2011 there were 183. Records with a zero time value and those with a call processing of greater than eight minutes were removed leaving 175, 159, 126, and 176 records to be analyzed for 1st apparatus on scene.

Call Processing and Turnout for One or Two Vehicle Crashes

Benchmark 1:30 90% Baseline 2:00 90%			
Call Processing	**Records**	**1:30**	**2:00**
2008	196	21.9%	37.8%
2009	177	38.6%	54.5%
2010	159	38.3%	61.7%
2011	183	49.1%	66.9%
Benchmark 1:00 90% Baseline 1:30 90%			
Turnout Time	**Records**	**1:00**	**1:30**
2008	196	62.4%	88.2%
2009	177	68.3%	92.8%
2010	159	66.4%	94.3%
2011	183	65.3%	93.2%

Travel Time One or Two Vehicle Crashes

Benchmark 4:30 90% Baseline 5:12 90%					
Travel Time		**Records**	**4:30**	**5:00**	**5:15**
1ST Apparatus on Scene	2008	175	82.8%	87.9%	87.9%
	2009	159	85.5%	91.8%	92.5%
					5:12
	2010	126	83.2%	87.2%	88.8%
	2011	176	83.4%	90.5%	92.3%
Benchmark 8:00 Baseline 10:24 90%					
Travel Time		**Records**	**8:00**	**10:00**	
2nd Apparatus on Scene	2008	90	93.3%	97.8	
	2009	78	94.9%	98.7%	
				10:24	
	2010	56	89.3%	98.2%	
	2011	99	90.8%	96.9%	

Total Response Time One or Two Vehicle Crashes

Benchmark 7:00 90% Baseline 8:42 90%				
Total Response Time		**Records**	**7:00**	**8:45**
1ST Apparatus on Scene	2008	175	67.4%	80.6%
	2009	159	75.5%	90.6%
				8:42
	2010	126	77.8%	91.3%
	2011	176	74.4%	89.8%
Benchmark 10:30 90% Baseline 13:54 90%				
Total Response Time		**Records**	**10:30**	**13:00**
2nd Apparatus on Scene	2008	90	85.6%	93.3%
	2009	78	88.5%	98.7%
	2010	56	83.9%	94.6%
	2011	99	85.7%	93.9%

Response Time Performance for 2011 Structure Fires Only
The following table represents structure fires only for 2011 and excludes planning zone 8.

2011 Structure Fires Only (*NEED TO FINISH OR REMOVE bottom half FOR 2012*)

Fire Response to **Moderate** Risk Occupancies	Baseline	Benchmark	Baseline Compliance Rate	Benchmark Compliance Rate
Call Processing	1:30 - 90%	1:00 - 90%	84.0%	40.0%
First Due Unit Arrival	8:12 - 90%	7:00 - 90%	88.0%	84.0%
First Due Travel Time	5:12 - 90%	4:30 - 90%	87.5%	79.2%
Arrival of Initial Full Alarm Assignment	13:24 - 90%	11:00 - 90%	100%	100%
Travel Time Full Alarm	10:24 - 90%	8:00 - 90%	100%	100%
Fire Response to **High** Risk Occupancies	Baseline	Benchmark	Baseline Compliance Rate	Benchmark Compliance Rate
Call Processing	1:30 - 90%	1:00 - 90%	54.7%	9.4%
First Due Unit Arrival	8:12 - 90%	6:30 - 90%	94.4%	81.5%
First Due Travel Time	5:12 - 90%	4:30 - 90%	92.5%	86.8%
Arrival of Initial Full Alarm Assignment	13:24 - 90%	11:00 - 90%	90.0%	73.3%
Travel Time Full Alarm	10:24 - 90%	9:00 - 90%	86.7%	73.3%

Response Time Performance for Hazardous Material
The following represents call processing and turnout time for hazardous materials department wide.

Call Processing and Turnout for Hazardous Materials

Benchmark 1:00 90% Baseline 2:00 90%			
Call Processing	Records	1:00	2:00
2008	167	9.0%	22.8%
2009	157	7.2%	28.8%
2010	167	13.1%	44.4%
2011	176	12.9%	67.3%
Benchmark 1:00 90% Baseline 2:00 90%			
Turnout Time	Records	1:30	2:00
2008	167	49.4%	91.4%
2009	157	75.8%	88.9%
2010	167	95.7%	99.4%
2011	176	51.7%	98.3%

The following tables represent department response performance excluding PZ7 and PZ8.

Travel Time Hazardous Materials excluding PZ7 & PZ8 (excludes only PZ8 in 2010 & 2011)

Baseline 5:12 90% Benchmark 4:30 90%					
Travel Time		Records	4:30	5:00	5:15
1ST Apparatus on Scene	2008	104	76.9%	82.7%	84.6%
	2009	110	73.6%	82.7%	88.2%
					5:12
	2010	164	64.8%	73.5%	75.9%
	2011	170	72.3%	77.7%	80.7%
Baseline 10:24 90% Benchmark 8:00					
Travel Time		Records	8:00		10:00
2nd Apparatus on Scene	2008	57	94.7%		98.2%
	2009	58	94.8%		100%
					10:24
	2010	91	91.1%		96.7%
	2011	95	88.0%		96.7%

Total Response Time Hazardous Materials excluding PZ7 & PZ8 (excludes only PZ8 in 2010 & 2011)

Baseline 9:42 Benchmark 7:00 90%				
Total Response Time		Records	9:30	7:00
1ST Apparatus on Scene	2008	104	77.9%	35.6%
	2009	110	82.7%	38.2%
			9:42	
	2010	164	87.7%	58.3%
	2011	170	91.1%	60.1%
Baseline 14:24 90% Benchmark 10:30 90%				
Total Response Time		Records	14:00	10:30
2nd Apparatus on Scene	2008	57	96.5%	64.9%
	2009	58	98.3%	75.9%
			14:24	10:30
	2010	91	94.4%	86.5%
	2011	95	93.6%	80.9%

Total Response Time 846 on Scene

Baseline 20:00 90% Benchmark 18:00 90%			
Year	Records	20:00	18:00
2008	17	100%	94.1%
2009	23	100%	95.7%
2010	22	100%	95.5%
2011	24	100%	100%

Response Time Performance for Water/Ice Rescue

For 2008, 2009, and 10 there were thirteen emergency responses for water/ice rescue. In 2011 there was one. The following tables represent the response times for those incidents.

Travel Time Water/Ice Rescue

Baseline 5:12 90% Benchmark 4:30 90%					
Travel Time		Records	4:30	5:00	5:15
1ST Apparatus on Scene	2008	3	80.0%	80.0%	80.0%
	2009	5	100%	100%	100%
					5:12
	2010	5	20.0%	20.0%	20.0%
	2011	1	100%	100%	100%
Baseline 10:24 90% Benchmark 8:00					
Travel Time		Records	8:00	10:00	
2nd Apparatus on Scene	2008	3	100%	100%	
	2009	1	100%	100%	
				10:24	
	2010	4	66.7%	100%	
	2011	1	0%	100%	

Total Response Time Water/Ice Rescue

Baseline 9:42 Benchmark 7:00 90%				
Total Response Time		Records	9:30	7:00
1ST Apparatus on Scene	2008	3	66.7%	66.7%
	2009	5	80.0%	80.0%
			9:42	
	2010	5	66.7%	0%
	2011	1	100%	0%
Baseline 14:24 90% Benchmark 11:00 90%				
Total Response Time		Records	14:15	11:00
2nd Apparatus on Scene	2008	3	100%	100%
	2009	1	100%	100%
			14:24	
	2010	4	100%	50%
	2011	1	100%	0%

Total Response Time Total Alarm On Scene

Baseline 15:24 90% Benchmark 14:00 90%			
Year	Records	15:15	14:00
2008	3	100.0%	100%
2009	1	100.0%	100%
2010	1	0%	0%
2011	1	0%	0%

Response Time Performance for Structural Collapse, High Angle, Trench, Confined Space
In the past four years up through the end of 2009, there is only one incident record involving these types of rescues. There were none in 2010 and only in 2011. They were both high angle rescues. Therefore, there is not sufficient response data to verify the stated performance measure. Based on the results of the response time analysis for the various other identified measures, the FFD staff is confident that the first apparatus on scene response to technical rescue would be similar. The first alarm on scene would also be similar with the exception of the deployment of the technical rescue trailer.

Response Time Performance by Planning Zone

Response Times Planning Zones 1-7
The following charts represent planning zones 1-7, which fall into the urban population categories. Planning zones 7 & 8 have different population densities and are evaluated separately. Station 7 opened in 2010 and is represented in the charts for 2010 and 2011. This response data does not include hazardous material responses and represents apparatus that responded emergent. Records with a zero time value and those with a call processing of greater than eight minutes were also removed.

Travel Time 1st Apparatus on Scene

Benchmark 4:30 90% Baseline 5:12 90%					
Planning Zone		Records	4:30 Travel Time	5:00 Travel Time	5:15 Travel Time
PZ 1	2008	881	91.8%	94.8%	95.7%
	2009	783	90.3%	93.5%	94.9%
	2010	723	87.3%	92.5%	94.0% (5:12)
	2011	711	90.6%	93.7%	94.9% (5:12)
PZ 2	2008	528	82.3%	88.0%	89.4%
	2009	510	79.6%	86.5%	88.2%
	2010	451	80.4%	87.3%	90.0% (5:12)
	2011	471	83.5%	88.9%	90.6% (5:12)
PZ 3	2008	414	89.3%	94.7%	95.6%
	2009	381	83.7%	89.5%	92.1%
	2010	392	86.4%	91.3%	92.6% (5:12)
	2011	473	87.9%	91.9%	93.8% (5:12)
PZ 4	2008	365	88.5%	93.7%	94.2%
	2009	307	86.6%	91.5%	94.1%
	2010	286	81.1%	90.5%	92.3% (5:12)
	2011	296	86.9%	91.7%	93.8% (5:12)
PZ 5	2008	548	81.0%	87.0%	89.8%
	2009	467	78.4%	87.2%	89.5%
	2010	446	78.5%	86.4%	88.0% (5:12)
	2011	432	81.3%	89.2%	91.1% (5:12)
PZ 6	2008	65	80.0%	90.8%	92.3%
	2009	53	90.6%	90.6%	90.6%
	2010	50	80.0%	86.0%	86.0% (5:12)
	2011	67	62.1%	72.7%	80.3% (5:12)
PZ7	2010	108	68.5%	75.0%	76.9% (5:12)
	2011	192	72.6%	81.7%	83.3% (5:12)

Total Response Time 1st Apparatus on Scene

Benchmark 7:00 90% Baseline 8:12 90%					
Planning Zone		Records	7:00	8:00	8:15
PZ 1	2008	881	65.7%	81.0%	84.1%
	2009	783	76.2%	87.2%	89.7%
	2010	723	83.5%	93.5%	94.3% (8:12)
	2011	711	83.4%	92.5%	93.9% (8:12)
PZ 2	2008	528	48.7%	70.1%	73.3%
	2009	510	59.2%	75.5%	79.2%
	2010	451	75.6%	87.4%	88.7% (8:12)
	2011	471	71.1%	86.8%	87.7% (8:12)
PZ 3	2008	414	66.7%	81.4%	83.8%
	2009	381	66.7%	82.4%	86.4%
	2010	392	83.0%	91.8%	93.1% (8:12)
	2011	473	81.0%	90.9%	92.2% (8:12)
PZ 4	2008	365	60.3%	76.7%	80.8%
	2009	307	68.1%	81.4%	84.0%
	2010	286	76.2%	89.2%	90.2% (8:12)
	2011	296	74.9%	85.1%	86.1% (8:12)
PZ 5	2008	548	56.6%	73.9%	77.0%
	2009	467	59.1%	78.4%	82.2%
	2010	446	77.3%	89.2%	91.5% (8:12)
	2011	432	76.6%	86.8%	88.6% (8:12)
PZ 6	2008	65	50.8%	70.8%	72.3%
	2009	53	69.8%	81.1%	83.0%
	2010	50	78.0%	88.0%	87.9% (8:12)
	2011	67	59.7%	82.1%	82.1% (8:12)
PZ7	2010	108	63.6%	84.1%	87.9% (8:12)
	2011	192	61.5%	80.2%	83.9% (8:12)

Travel Time 2nd Apparatus on Scene

Benchmark 8:00 90% Baseline 10:24 90%				
Planning Zone		Records	8:00	10:15
PZ 1	2008	296	99.3%	99.7%
	2009	322	99.7%	100.%
	2010	322	99.1%	100.% (10:24)
	2011	291	98.6%	99.0% (10:24)
PZ 2	2008	90	95.6%	98.9%
	2009	100	95.0%	98.0%
	2010	95	89.4%	97.9%(10:24)
	2011	73	91.7%	100% (10:24)
PZ 3	2008	58	93.1%	100.%
	2009	53	96.2%	100.%
	2010	67	91.0%	98.5%(10:24)
	2011	67	92.4%	97.0% (10:24)
PZ 4	2008	160	98.8%	100.%
	2009	152	100%	100.%
	2010	138	99.3%	100.% (10:24)
	2011	139	100%	100% (10:24)
PZ 5	2008	97	96.9%	99.0%
	2009	84	95.2%	100.%
	2010	95	95.8%	100% (10:24)
	2011	88	98.9%	100% (10:24)
PZ 6	2008	20	90.0%	95.0%
	2009	15	100%	100.%
	2010	20	100%	100% (10:24)
	2011	24	100%	100% (10:24)
PZ7	2010	34	91.2%	100% (10:24)
	2011	33	81.8%	93.9% (10:24)

Total Response Time 2nd Apparatus on Scene

Benchmark 10:00 90% Baseline 13:24					
Planning Zone		Records	10:00	13:00	13:15
PZ 1	2008	295	95.9%	99.0%	99.7%
	2009	320	96.6%	99.7%	99.7%
	2010	322	97.8%	99.4%	99.4% (13:24)
	2011	291	97.6%	98.6%	98.6% (13:24)
PZ 2	2008	90	61.1%	92.2%	96.7%
	2009	100	79.6%	96.0%	96.0%
	2010	95	86.3%	95.8%	96.8% (13:24)
	2011	73	89.0%	97.3%	97.3% (13:24)
PZ 3	2008	58	75.9%	96.6%	96.6%
	2009	53	71.7%	96.2%	98.1%
	2010	67	84.8%	95.5%	95.5% (13:24)
	2011	67	86.6%	97.0%	97.0% (13:24)
PZ 4	2008	160	90.0%	99.4%	99.4%
	2009	152	94.7%	100.%	100.%
	2010	138	99.3%	100.%	100.% (13:24)
	2011	139	97.8%	100%	100% (13:24)
PZ 5	2008	97	73.2%	93.8%	96.9%
	2009	84	83.3%	98.8%	98.8%
	2010	95	88.4%	97.9%	97.9%
	2011	88	97.7%	100%	100% (13:24)
PZ 6	2008	20	75.0%	85.0%	85.0%
	2009	15	80.0%	100.%	100.0%
	2010	20	95.0%	100%	100% (13:24)
	2011	24	91.7%	100%	100% (13:24)
PZ7	2010	34	88.2%	97.1%	97.1% (13:24)
	2011	33	72.7%	97.0%	97.0% (13:24)

Response Time Performance Planning Zones 7 & 8

In the following tables, the data for PZ 7 reflects time based on the criteria for an area with a suburban population density. PZ 8 data is based on criteria for a rural population density.

PZ 7 Response Times

Baseline 6:30 90%				
Travel Time		Records	5:00	6:30
1ST Apparatus on Scene	2008	178	39.3%	69.7%
	2009	171	25.1%	58.5%
	2010	128	62.1%	87.9%
	2011	192	81.7%	94.6%
Baseline 9:30 90%				
Total Response Time		Records	8:00	9:30
1st Apparatus on Scene	2008	178	23.0%	48.9%
	2009	171	22.8%	47.4%
	2010	128	73.2%	90.6%
	2011	192	80.2%	92.2%

Baseline 13:24 90%				
Total Response Time		Records	11:00	13.15
2nd Apparatus on Scene	2008	36	55.6%	80.6%
	2009	32	62.5%	84.4%
	2010	128	86.8%	94.7%
	2011	33	81.8%	97.0%

PZ 8 Response Times

Baseline 13:00 90%				
Travel Time		Records	10:00	13:00
1ST Apparatus on Scene	2008	66	98.5%	98.5%
	2009	41	95.1%	100%
	2010	34	100%	100%
	2011	40	100%	100%
Baseline 16:00 90%				
Total Response Time		Records	13:00	16:00
1st Apparatus on Scene	2008	66	92.4%	98.5%
	2009	41	92.7%	100%
	2010	34	94.1%	100%
	2011	40	97.5%	100%
Baseline 21:12 90%				
Total Response Time		Records	17:00	21.20
2nd Apparatus on Scene	2008	9	100%	100%
	2009	10	100%	100%
	2010	6	100%	100% (21:12)
	2011	7	100%	100% (21:12)

Response Time Summary PZ 7 & PZ 8

With the opening of Station 7, the response times for PZ 7 exceed the criteria for a suburban population density

PZ 8 exceeds all of the stated performance measures based on the criteria for rural population density. It is the intention of the FFD to closely monitor the development and call volume in this planning zone. As stated in the Strategic Plan Document, the FFD administration has recommended to the City leaders that land for a future fire station should be acquired in this zone.

Structure Fires 2011

1st Arrival Total Response Time 2011

Baseline 8:12 Benchmark 6:30 90%
There are 47 Apparatus records being analyzed.

Call to Arrival at 00:06:30 = 78.1%
Call to Arrival at 00:08:12 = 94.5%

Median Call to Arrival 00:05:04
Average Call to Arrival 00:05:25

1st Alarm Total Response Time 2011

Baseline 13:24 Benchmark 11:00 90%
There are 47 Apparatus records being analyzed.

Call to 1st Alarm Arrival at 00:11:00 = 86.8%
Call to 1st Alarm Arrival at 00:13:24 = 92.1%

Median Call to 1st Alarm Arrival 00:08:01
Average Call to 1st Alarm Arrival 00:07:48

Hazmat 1st Apparatus on Scene (Urban)

2011
Baseline 9:42 90% Benchmark 7:00 90%
There are 28 Apparatus records being analyzed.

Call to Arrival at 00:07:00 57.1%
Call to Arrival at 00:09:42 92.9%

Median Call to Arrival 00:06:23
Average Call to Arrival 00:06:51

EMS 1st Arrival

2011
Baseline 8:12 90% Benchmark 7:00 90%
There are 1112 Apparatus records being analyzed.

Call to Arrival at 00:07:00 63.7%
Call to Arrival at 00:08:12 83.0%

Median Call to Arrival 00:06:21
Average Call to Arrival 00:06:33

Response Reliability

The FFD refers to response reliability as the percentage of time that a first due unit is available for calls in its primary response zone. If a unit was able to respond to every call for service that it was dispatched to, it would have 100% unit reliability. There are several reasons why a first due unit might not be available for calls in its primary area; responding to another call, training out of area, and equipment failure are a few examples.

The FFD puts emphasis on maintaining adequate City wide emergency response coverage during day to day activities. This is accomplished using several methods. The first is by using technological tools such as Gotomeeting which allows for meetings and classroom training sessions without any units having to leave their primary response area. The second method, which is used when Gotomeeting is not possible, is trading coverage areas. Most other training occurs at Stations 4 and 6. To maintain adequate coverage, units from Stations 4 and 6 are repositioned to cover the response areas of the units attending training. For example, Engine 804 stands by for Engine 802 while 802 is at the training ground. 804 now becomes the primary engine in 802's area. From April until November, this occurs almost daily.

Because the City is long and narrow, the department maintains a policy indicating that whenever possible, there will be units available in the northern and southern most areas, as well as what is considered the core of the City. This would be primary response zones 2, 3 and 4. This policy is outlined in SOG 1-6-6 as well as personnel call back procedures when an apparatus is going to be committed for an extended period of time. An example of the department's effort to increase reliability was designating fuel locations throughout the City. In the past, all apparatus were refueled at the City maintenance garage, which meant they had to leave their primary response areas. Now apparatus fill with fuel within their areas.

Prior to the accreditation process, data was not entered into the RMS which accurately reflected when apparatus were covering other assignments. More user defined fields have been added into the RMS, which will improve the accuracy of the 2009 run data. It is the intention of the FFD to monitor the results and include this information in future SOC documents.

An analysis was conducted to determine the amount of simultaneous incidents in each planning zone for 2008, 2009, 2010, 2011. The following table indicates the results of this analysis. These numbers reflect the number of times two incidents occurred in the same planning zone at the same time.

New World not recording simultaneous

	Total Runs				Simultaneous Runs				Percentage			
	2008	2009	2010	2011	2008	2009	2010	2011	2008	2009	2010	2011
PZ 1	1,288	1,254	1,291	1,342	82	95	110	53	6.3%	7.5%	8.5%	3.9%
PZ 2	710	766	806	771	19	32	41	35	2.7%	4.1%	5.1%	4.5%
PZ 3	625	647	707	864	20	21	32	30	3.2%	3.2%	4.5%	3.5%
PZ 4	523	497	545	577	14	10	25	18	2.6%	2.0%	4.6%	3.1%
PZ 5	704	664	691	680	31	25	22	29	4.4%	3.7%	3.2%	4.3%
PZ 6	96	72	76	97	1	2	1	6	1.0%	2.7%	1.3%	6.2%
PZ 7	238	229	284	351	4	4	6	14	1.7%	1.7%	2.1%	4.0%
PZ 8	89	69	74	81	1	0	0	2	1.1%	0.0%	0.0%	2.5%
Dept. wide	4,280	4,209	4,474	4,785	172	191	237	187	4.0%	4.5%	5.3%	3.9%

This table demonstrates that there are no planning zones within the City that have a high percentage of simultaneous runs. In each planning zone, the primary apparatus is unavailable due to other incidents less than 10% of the time for each of the planning zones.

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